HILO AREA
COMPREHENSIVE STUDY
VOLUME 1 OF 4

Summary Report

DRAFT
SURVEY REPORT AND
DRAFT ENVIRONMENTAL
IMPACT STATEMENT

APRIL 1983

US Army Corps
of Engineers
Pacific Ocean Division

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858

July 12, 1983

Enclosed for your review and comment are the following draft reports and draft environmental impact statements for the Hilo Area Comprehensive Study.

a. Summary Report. This report describes the overall study in general terms.

b. Hilo Breakwater Modification: Draft Survey Report and Draft Environmental Impact Statement. This report discusses the feasibility of modifying the Hilo Breakwater to improve water quality and to reduce its long-term maintenance and repair costs.

c. Hilo Bayfront Beach: Draft Survey Report and Draft Environmental Impact Statement. This report discusses the feasibility of restoring the Hilo Bayfront Beach to improve recreational opportunities and prevent overtopping of the Bayfront Highway.

d. Reeds Bay Small Craft Harbor: Draft Reevaluation Report and Draft Environmental Impact Statement. This report discusses the feasibility of constructing a small craft harbor at the mouth of Reeds Bay.

e. Kumukahi Small Craft Harbor: Draft Survey Report and Draft Environmental Impact Statement. This report discusses the feasibility of constructing a small craft harbor for commercial fishing at Kumukahi in Puna District.

We request that you review the above reports and EIS's and provide written comments by September 1, 1983. Comments or questions may be addressed to the following:

District Engineer
US Army Corps of Engineers
Honolulu District
Building 230
Fort Shafter, Hawaii 96858

A public meeting will be held in Hilo on August 25 to receive public views on the above reports. You will be notified later of the time and place. For further information, please call Mr. Gene Dashiell (Study Manager) at 438-2249 or 438-9526.

Sincerely,

Alfred J. Thiede
Colonel, Corps of Engineers
District Engineer

Enclosures

HILO AREA COMPREHENSIVE STUDY

A DRAFT SURVEY REPORT AND ENVIRONMENTAL IMPACT STATEMENT

VOLUME I

SUMMARY REPORT

Honolulu Engineer District

June 1983

SUMMARY

This is a DRAFT report for public review and comment which summarizes the investigations and recommendations of the Hilo Area Comprehensive Study (HACS). The following subjects were investigated:

- o Deep Draft Navigation *
- o Breakwater Improvements *
- o Shore Protection *
- o Recreational Small-Craft Navigation *
- o Commercial Small-Craft Navigation *
- o Hydropower Development **
- o Flood Damage Reduction ***
- o Recreation and Fish and Wildlife
- o Water Quality

We request your review and comment on this report. Comments may be addressed to:

District Engineer
Honolulu Engineer District
Bldg 230
Ft Shafter, Hawaii 96858
ATTN: Mr. Gene Dashiell
Telephone (808)438-2249

You may also make comments at the public meeting which we will hold in Hilo this summer. We will notify you of the date, time and place.

Copies of the draft report and environmental impact statements have been placed in public libraries in Hawaii County which are listed at the end of this report.

Following the public meeting, we will prepare final reports and environmental impact statements for potential Federal projects which are acceptable to the sponsors. These reports will be sent to the Board of Engineers for Rivers and Harbors for review. If approved, the reports will then go to the Secretary of the Army and the Office of Management and the Budget for their approval. Once these steps are completed, the reports will be sent to the Congress for authorization and appropriation of construction funds. Once funds are available-model tests, construction plans, and bid specifications can be prepared. Nationally, for Corps of Engineers projects, the time between completion of the final report and the start of construction is typically 5 years. However, individual projects may vary.

* Possible Federal project, Draft Report and Environmental Impact Statement being circulated for review.
** Additional feasibility studies underway.
*** Possible projects for implementation by local government.

HILO AREA COMPREHENSIVE STUDY

A DRAFT SURVEY REPORT AND ENVIRONMENTAL IMPACT STATEMENT

VOLUME I: SUMMARY REPORT

TABLE OF CONTENTS

Section	Title	Page
	INTRODUCTION	iv
I	STUDY COMPONENTS	
	A. Deep Draft Navigation	1
	B. Breakwater Improvements	2
	C. Shore Protection	3
	D. Small-Craft Navigation Facilities	4
	E. Hydropower Development	6
	F. Flood Damage Reduction	7
	G. Recreation and Fish and Wildlife	9
	H. Water Quality	12
II	COORDINATION AND PUBLIC VIEWS	
	INTRODUCTION	13
	MEETINGS AND WORKSHOPS	
	Initial HACS Public Meeting (27 April 1976) Summary of Meeting	13
	Small-Craft Navigation Workshop (23 May 1977) Summary of Workshop	13
	Small-Craft Navigation Workshop (13 June 1977) Summary of Workshop	14
	Small-Craft Facilities Workshop (26 April 1978) Summary of Workshop	14
	Deep Draft & Small-Craft Navigation Workshop (28 Feb 80) Summary of Workshop	15
	Public Meeting - Deep Draft & Small-Craft Navigation (20 August 1980) Summary of Public Meeting	15
	Small-Craft Facilities Workshop (11 February 1981) Summary of Workshop	15

TABLE OF CONTENTS (CONT)

Section	Title	Page
II	COORDINATION AND PUBLIC VIEWS (Continued)	16
	Small-Craft Facilities Workshop (18 March 1981) Summary of Workshop	17
	Public Meeting - Deep-Draft and Small-Craft Navigation (17 September 1981) Summary of Public Meeting	17
	Small-Craft Harbor Workshop (4 February 1982) Summary of Workshop	17
	Entire Comprehensive Workshops (30 November 1982) Summary of Workshops	17
	DOCUMENTS PRODUCED DURING THIS STUDY .	17
	LIST OF LIBRARIES	20

LIST OF FIGURES

Figure No.	Title	Follows Page
1	Vicinity Map - Hilo Area Comprehensive Area	iv
2	Hilo Harbor Deep Draft Navigation Improvements - Recommended Plan	1
3	Hilo Breakwater Modification - Plan A	2
4	Hilo Area Comprehensive Study - Location Map	3
5	Hilo Bayfront - Plan A	3
6	Reeds Bay - 1963 Authorized Plan	4
7	Reeds Bay - Proposed Plan	4
8	Cape Kumukahi Small Boat Harbor - Proposed Plan	5
9	Location Map - Hydropower Study	6
10	Hilo Hydropower Study - Wailuku River	6
11	Hilo Hydropower Study - Honolii Stream	6
12	Flood Damage Reduction	7

LIST OF PHOTOGRAPHS

Title	Follows Page
Deep Draft Navigation - Hilo Harbor	1
Breakwater Improvements - Hilo Breakwater	1
Hilo Breakwater	2
Shore Protection - Bayfront Highway	3
Small-Craft Navigation (Recreation - Reeds Bay)	3
Small-Craft Navigation (Commercial) - Cape Kumukahi	5

INTRODUCTION

In 1973 the County Council of Hawaii requested a complete study of water resources and needs in the Hilo area (see Figure 1); in particular, Hilo Bay (Resolution No. 144, November 1973). Two years later the Council indicated a desire for a comprehensive plan for Hilo Bay (Resolution No. 480, November 1975). In 1976, the U.S. Congress authorized a comprehensive study of the Hilo Bay Area and requested that an implementation plan be prepared which would be compatible with the plans of other agencies. Quoted below is the text of the authorization.

> The Secretary of the Army, acting through the Chief of Engineers, in cooperation with the State of Hawaii and appropriate units of local government, shall make a study of methods to develop, utilize, and conserve water and land resources in the Hilo Bay Area, Hawaii, and Kailua-Kona, Hawaii. Such study shall include, but not be limited to, consideration of the need for flood protection, appropriate use of floodplain lands, navigation facilities, hydro-electric power generation, regional water supply and wastewater management facilities systems, recreational facilities, enhancement and conservation of water quality, enhancement and conservation of fish and wildlife, other measures for environmental enhancement, and economic and human resources development. Based upon the findings of such study, the Secretary of the Army, acting through the Chief of Engineers, shall prepare a plan for the implementation of such findings which shall be compatible with other comprehensive development plans prepared by local planning agencies and other interested Federal agencies. (Section 144, Water Resources Development Act of 1976)

This report summarizes the findings and recommmendations of the study done under this Congressional authorization. The study was named the Hilo Area Comprehensive Study and was done by the Honolulu Engineer District. It was initiated in 1976 and will be completed in 1983 with the submittal of the final report to the Board of Engineers for Rivers and Harbors (BERH). The recommendations and main findings are listed below. They are discussed in more detail in the following pages.

RECOMMENDATIONS

- Deepen the Hilo commercial harbor to 38 feet and the entrance channel to 39 feet.
- Modify the Hilo breakwater to improve water quality in Hilo Bay and to save maintenance and repair costs.
- Restore the Hilo Bayfront Beach.
- Construct a small craft harbor at Reed's Bay for 100 boats.
- Construct a small craft harbor at Kumukahi for 165 boats to serve primarily commercial fishing.

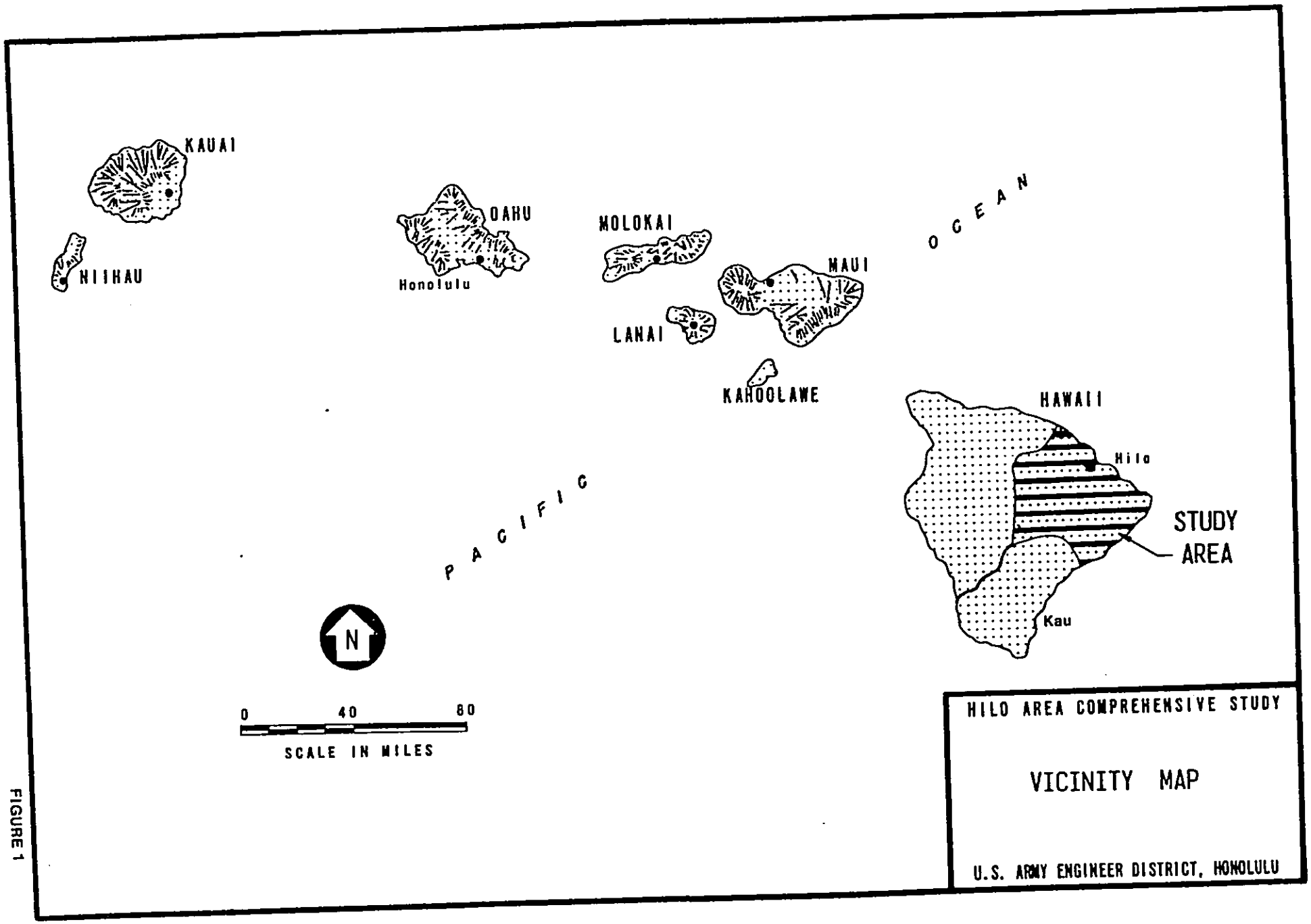

KAUAI
NIIHAU
OAHU
Honolulu
MOLOKAI
MAUI
LANAI
KAHOOLAWE
OCEAN
PACIFIC
HAWAII
Hilo
STUDY AREA
Kau
N
0 40 80
SCALE IN MILES
HILO AREA COMPREHENSIVE STUDY
VICINITY MAP
U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE 1

STUDIES TO BE COMPLETED. (Under different authority)

- o Investigations are underway to evaluate the feasibility of new hydroelectric power generation on the Wailuku River and on Honolii Stream.

LOCAL IMPLEMENTATION. Flood damages caused by drainage problems in the Hilo Mauka area could be reduced through implementation of miscellaneous drainage control projects.

OTHER FINDINGS. There is a potential for increased recreational use from visitors and residents. Hilo Bay's water quality may be further improved.

SECTION I

STUDY COMPONENTS

STUDY COMPONENTS

A. DEEP-DRAFT NAVIGATION.

The Hilo Harbor Interim Report for Deep-Draft Navigation Improvements was sent to the Board of Engineers for Rivers and Harbors for review in February 1982 by the US Army Engineer Division, Pacific Ocean. It discussed the problems facing deep-draft navigation including a turning basin too narrow and too shallow; unpredictable surge conditions in the commercial port; a shortage of dock-side space; and, the need for improvements to serve newer, larger vessels.

Deep-draft measures examined included changing the breakwater to reduce surge and filling in over Blonde Reef for more pier and cargo space. Investigations were made of the immediate and future regional needs for expansion of deep-draft navigation facilities. Major changes in the harbor were found to be unjustified because of the high costs involved and the probable lack of increase in future vessel traffic.

The recommended plan (Figure 2) consists of deepening the harbor from its present 35-foot depth to 38 feet to accommodate larger vessels. The total cost of the project is estimated to be $3.7 million. The benefit-to-cost ratio is 2.0.

With project authorization, design, and construction, the plan could be accomplished in about two years. Due to the simplicity of the recommended plan, no major problems are anticipated. The plan provides for more efficient ocean transport of cargo to and from the island of Hawaii and Hilo, its population and commercial center.

Consideration was given to all significant aspects in the public interest which included environmental, social, and economic effects, engineering feasibility and practical implementation.

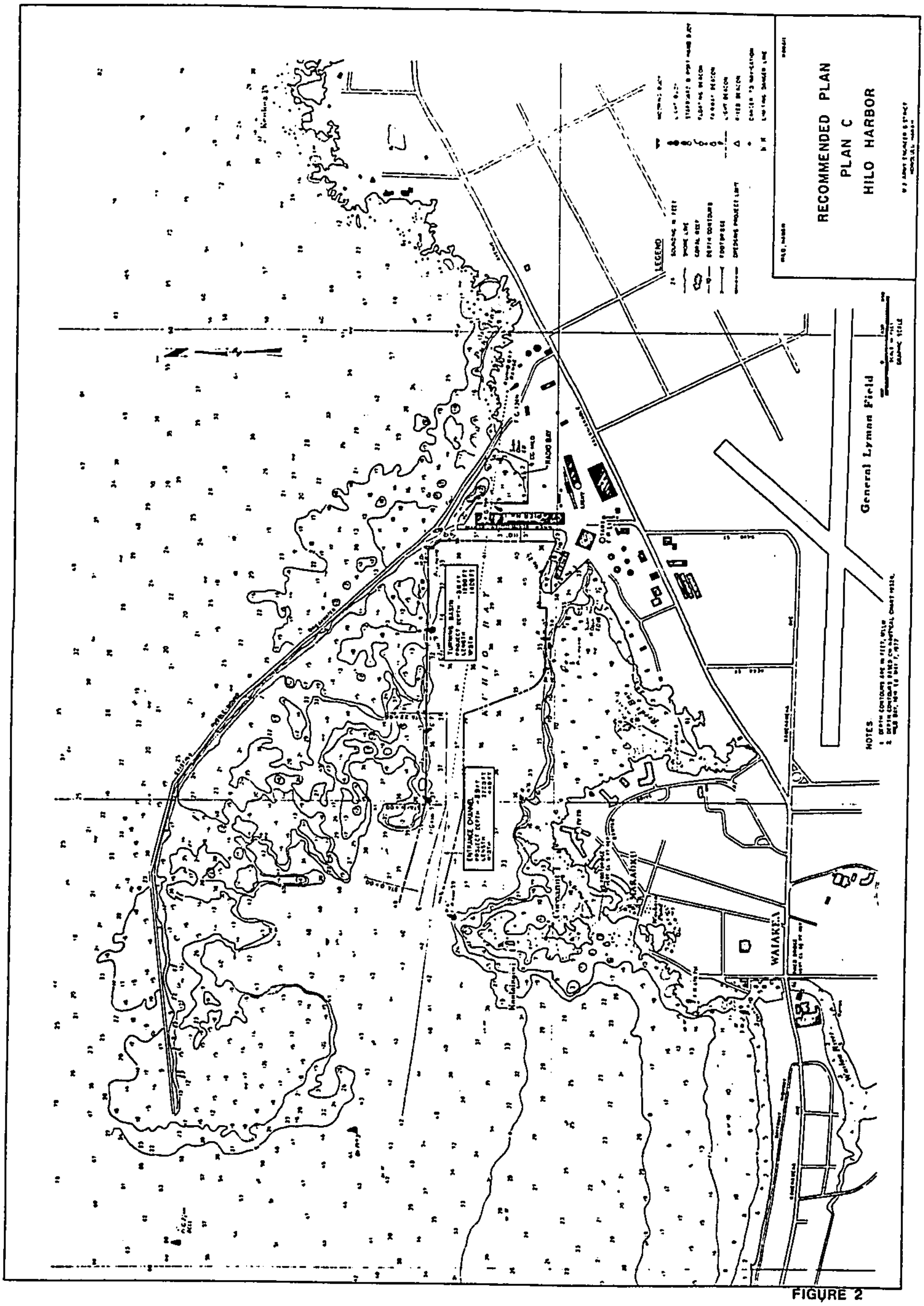
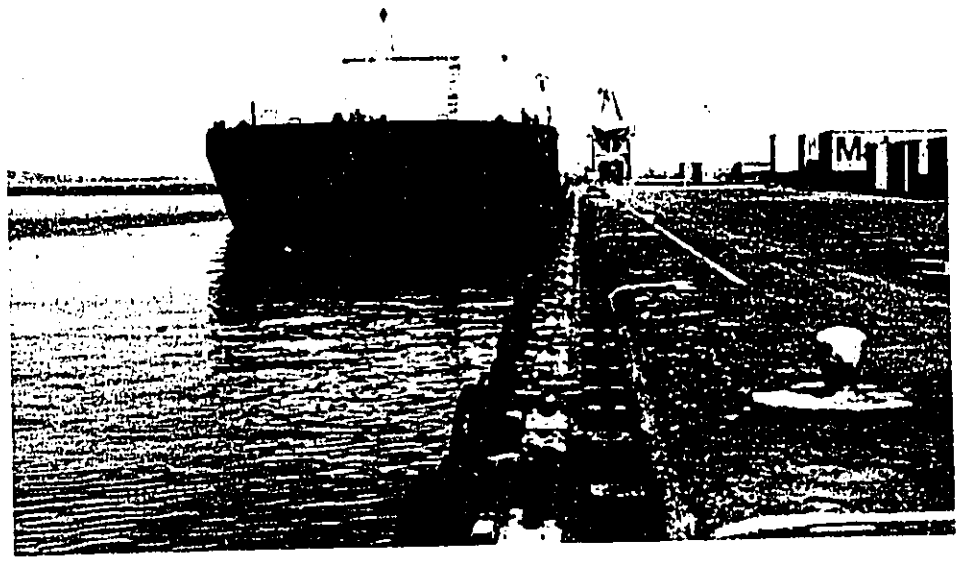
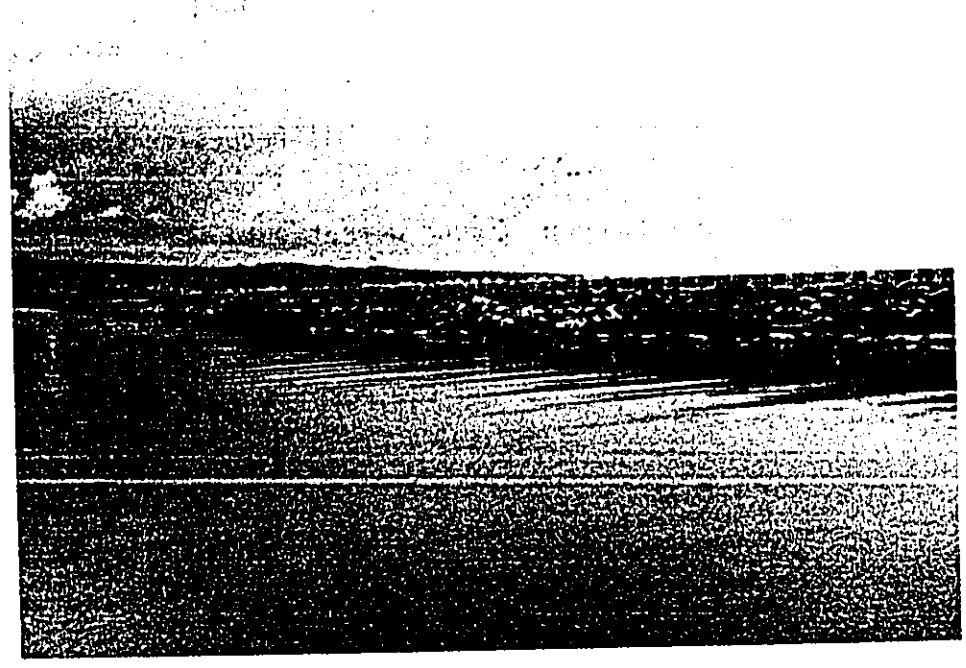

RECOMMENDED PLAN
PLAN C
HILO HARBOR
LEGEND
General Lyman Field
WAIAKEA
NOTES
TURNING BASIN
ENTRANCE CHANNEL
RADIO BAY

FIGURE 2



Deep-Draft Navigation

Hilo Harbor



Breakwater Improvements

Hilo Breakwater

B. BREAKWATER IMPROVEMENTS.

In order to reduce costs of maintenance and repairs, a plan was formulated to deauthorize the outer 7,500 feet of the existing breakwater. In the long term, water quality in Hilo Bay would be improved.

The site is the existing federal navigation project in Hilo Bay (Figure 3). In 1981, a 900-foot section directly seaward of Pier 1 was reinforced with tribars and covered with reinforced concrete ribs at a cost of $2 million. The 10,080-foot long breakwater was completed in 1930. It requires major repairs and has a high annual maintenance cost. The breakwater cuts off the circulation of fresh ocean water to Blonde Reef, the location of major coral growth in Hilo Bay. In addition, it altered the currents at the Bayfront Beach which changed the shape of the beach.

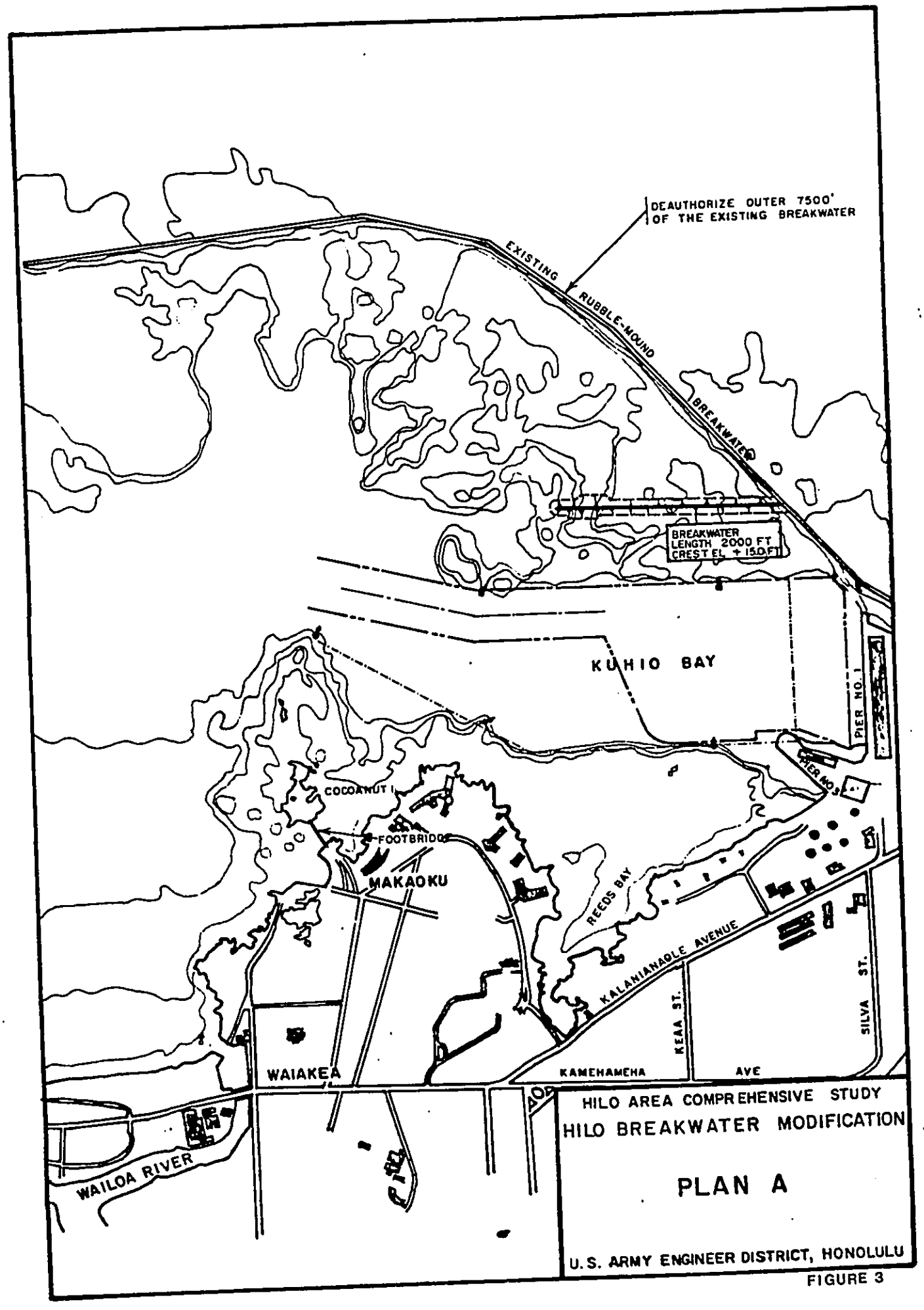
The following objectives were established for this study component: reduce the repair and maintenance costs of the Hilo Breakwater without adversely affecting the safety of ships using Hilo Harbor; improve water quality of Hilo Bay and coral resources of Blonde Reef; and, avoid aggravation of tsunami hazards in Hilo Bay.

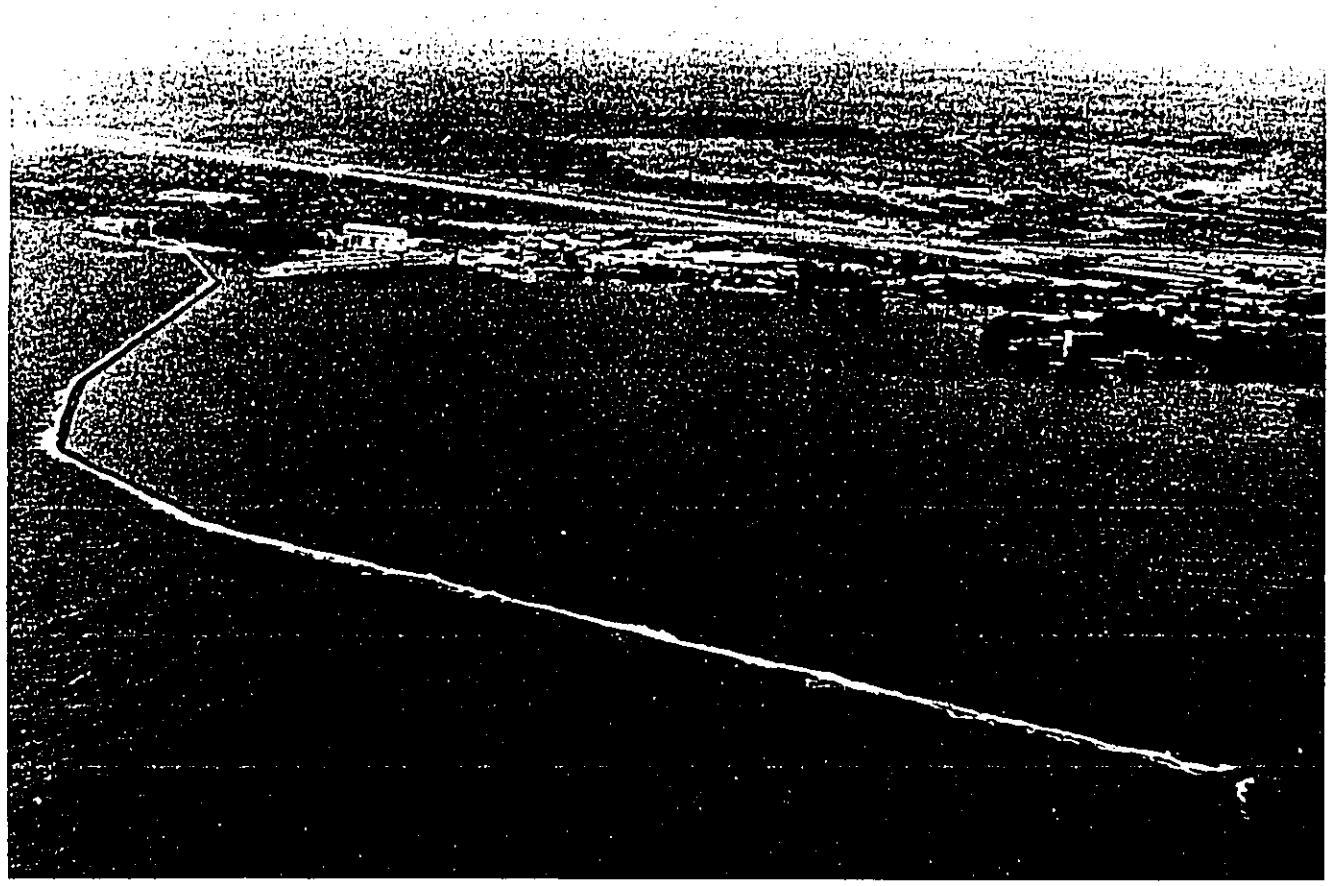
The tentative plan (Figure 3) would reduce Federal maintenance and repair costs over the next 50 years by deauthorizing the outer 7,500 feet of the existing breakwater and constructing a 2,000-foot inner breakwater along a new alignment to protect the Commercial Port.

As the breakwater gradually deteriorates, the amount of fresh ocean water entering the bay will increase. This would also improve the coral habitat along the Bayfront Beach and partially restore the westward current along the Bayfront Beach. Final alignment of the new inner breakwater depends on the results of a hydraulic model test which is a component of overall authorization. The model tests would show the effect of tsunamis on the existing shoreline. If alterations to the breakwater would not worsen the tsunami hazard, construction would proceed. Tests would also indicate possible methods of accelerating breakwater deterioration to speed up water quality improvements.

The tangible benefits of this plan are the cost reduction for maintenance and repair of the breakwater. The total first cost is estimated at $20 million. The benefit-to-cost ratio is 1.3. All costs would be borne by the Federal Government since cost savings accrue directly to it.

At the most recent public meeting held in September 1981, the public supported the objectives of improving coral habitat and the bay's water quality. They were concerned that tsunami impacts on the shoreline not be aggravated and were agreeable to accepting the results of hydraulic model tests on this point.


DEAUTHORIZE OUTER 7500'
OF THE EXISTING BREAKWATER
EXISTING RUBBLE-MOUND BREAKWATER
BREAKWATER
LENGTH 2000 FT.
CREST EL. +15.0 FT.
KUHIO BAY
PIER NO. 1
PIER NO. 3
COCOANUT I.
FOOTBRIDGE
MAKAOKU
REEDS BAY
KALANIANAOLE AVENUE
KEAA ST.
SILVA ST.
WAIAKEA
KAMEHAMEHA
AVE
WAILOA RIVER
HILO AREA COMPREHENSIVE STUDY
HILO BREAKWATER MODIFICATION
PLAN A
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FIGURE 3



BREAKWATER IMPROVEMENTS

HILO BREAKWATER

C. SHORE PROTECTION.

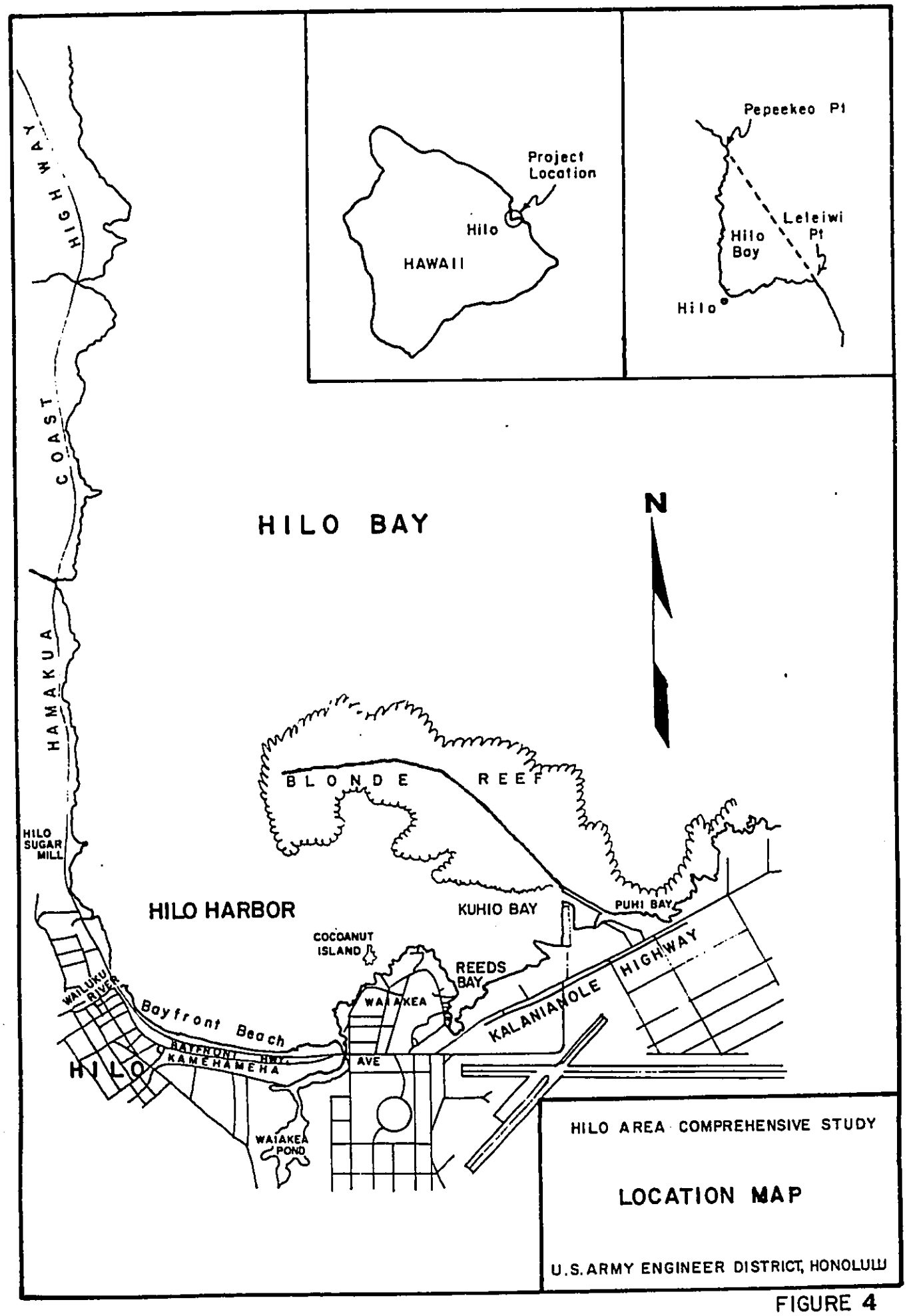
One of the broad objectives identified for the comprehensive study was an examination of the shoreline problems in the Hilo area. The major problems facing the Hilo Bayfront are the shoreline erosion which has significantly reduced the recreational beach area; damages to the highway which were caused by overtopping waves; and, the shoaling of the Wailoa River mouth. The Bayfront Highway has been closed for more than one day at least 13 times between 1970 and 1980 due to high storm waves.

The County's Bayfront Beach Park is located along the southern shoreline of Hilo Bay (Figure 4) fronting the State's Bayfront Highway. The beach is about 0.84 acres in size and is the only beach suitable for recreational use in the Hilo area. Due to a variety of reasons, including sand removal in the early 1900's for landfill purposes and erosion due to storm wave attack, the beach has eroded to its present size.

The purpose of the project is to protect the Bayfront Park and Highway from erosion and other storm wave damages; restore the eroded Bayfront Beach and enhance the recreation opportunities for residents and the visitor industry; prevent shoaling of the Wailoa River mouth which is a light-draft navigation channel for two existing State small boat harbors.

The tentative plan (Figure 5) combines elements of several alternatives in order to meet the project objectives. Beginning at the west end of the beach, Plan A includes constructing a surfing shoal, a protective beach (providing 250,000 square feet of dry recreational beach area) stabilized by four rock groins, a rock revetment (crest elevation 15 feet and 1,200 feet long), and a 200-foot long jetty groin near the Wailoa River. This plan is estimated at a total cost of $8,966,000. There are no significant adverse environmental or social effects from the implementation of this plan.

Without improvements and protective works, storm waves will continue to erode the shoreline. There is an opportunity here to restore the recreational beach which in turn will protect the Bayfront Highway from wave attack.



HILO AREA COMPREHENSIVE STUDY

LOCATION MAP

U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE 4

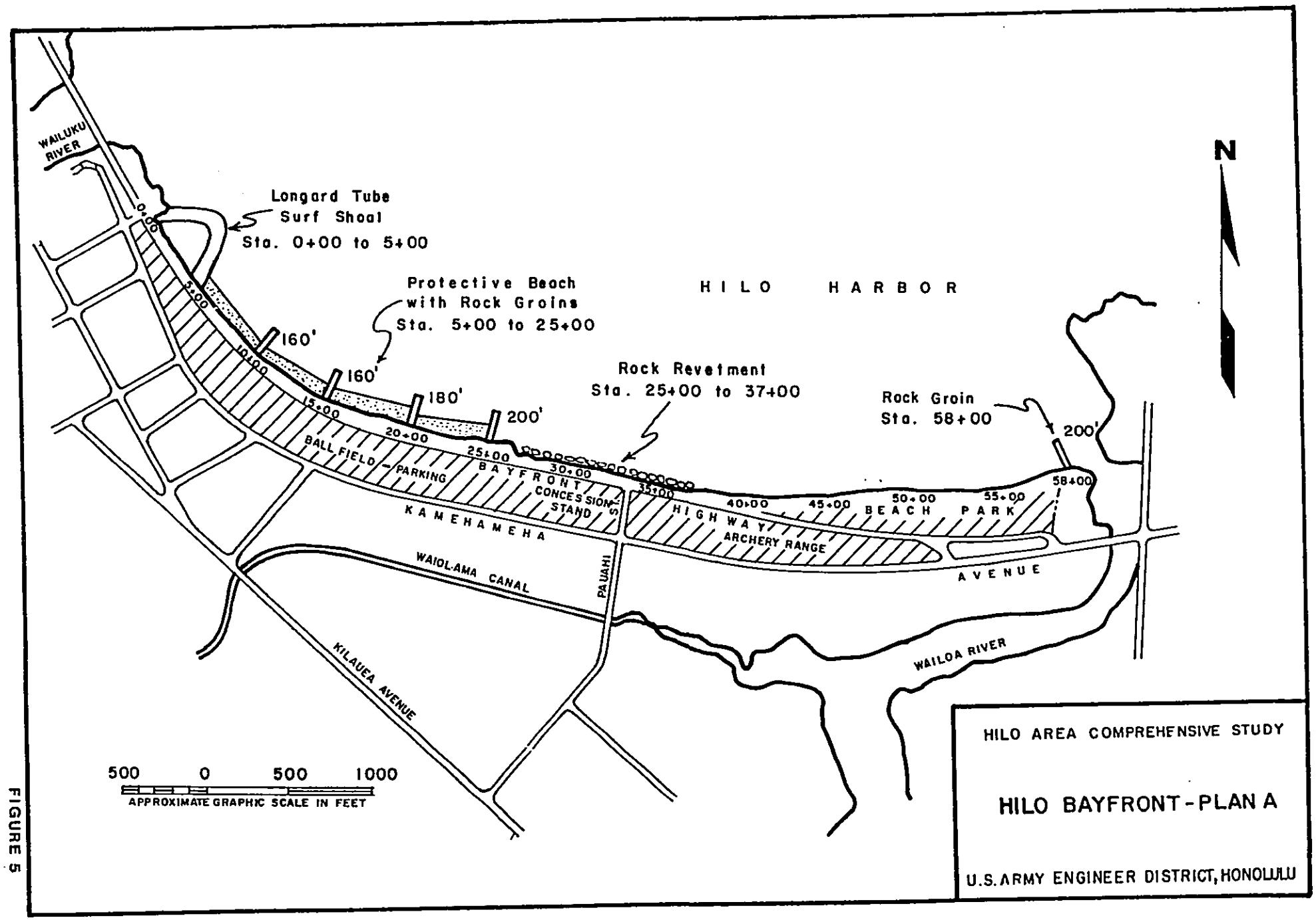
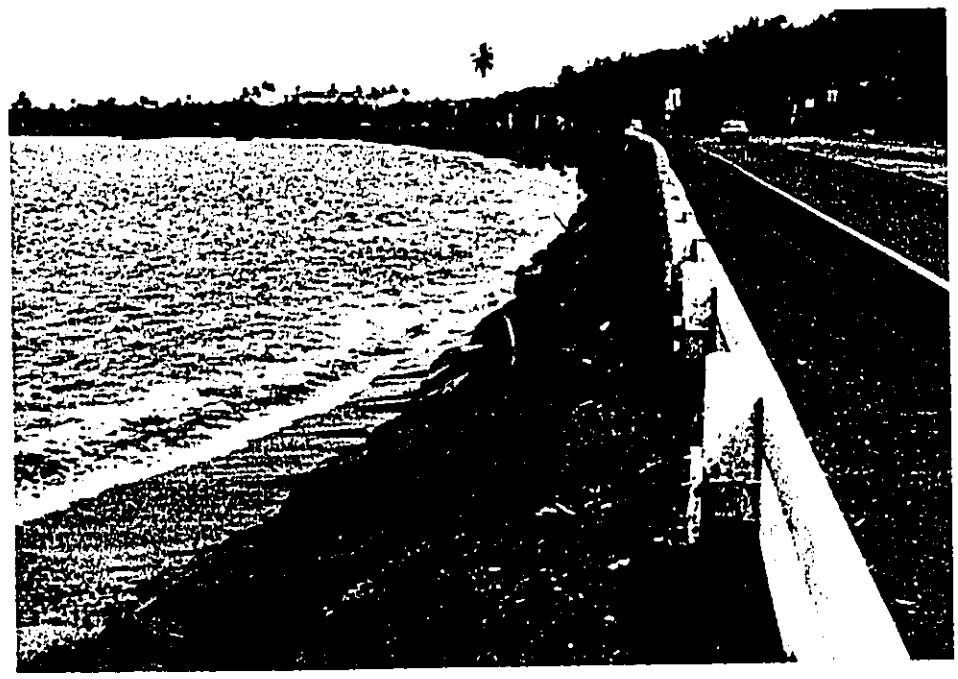
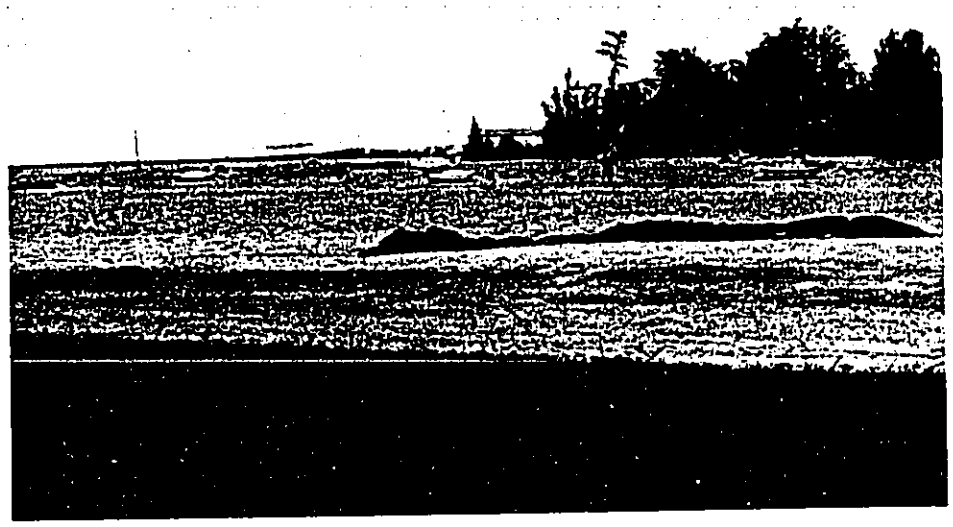

WAILUKU RIVER
Longard Tube
Surf Shoal
Sta. 0+00 to 5+00
Protective Beach
with Rock Groins
Sta. 5+00 to 25+00
HILO HARBOR
Rock Revetment
Sta. 25+00 to 37+00
Rock Groin
Sta. 58+00
160'
160'
180'
200'
200'
0+00
5+00
10+00
15+00
20+00
25+00
30+00
35+00
40+00
45+00
50+00
55+00
58+00
BALL FIELD
PARKING
BAYFRONT
CONCESSION STAND
KAMEHAMEHA
HIGHWAY
ARCHERY RANGE
BEACH PARK
AVENUE
WAIOL-AMA CANAL
PAUAHI
KILAUEA AVENUE
WAILOA RIVER
N
500 0 500 1000
APPROXIMATE GRAPHIC SCALE IN FEET
HILO AREA COMPREHENSIVE STUDY
HILO BAYFRONT - PLAN A
U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE 5



Shore Protection

Bayfront Highway



Small Craft Navigation
(Recreation)

Reeds Bay

D. SMALL-CRAFT NAVIGATION FACILITIES.

INTRODUCTION.

Sites for the small craft facilities were selected based on field investigations, numerous public workshops and meetings. An initial list of 16 sites was compiled. Four possible sites were chosen from the list after screening for lack of historic values; available land for shoreside facilities; proximity to fishing grounds; and suitable public access. One of the four sites, Reeds's Bay, was suitable for a recreational boating harbor because of its location in the relatively sheltered waters of Hilo Bay and its proximity to Hilo. The other three sites were suitable for a commercial fishing harbor because of large amounts of land available for shoreside facilities. However, Leleiwi Point, on County land, was felt to be too distant from the popular fishing grounds at Kumukahi. The Kings landing site, on private land is also distant from the Kumukahi grounds. Also fishermen had expressed concern over the difficult sea conditions at both sites. Kumukahi, close to good fishing grounds, and with adequate land for shoreside facilities, is located on Federal land. It is approximately a 35 minute drive from Hilo, but fishermen repeatedly supported the short drive to the harbor from Kumukahi and they were not in favor of the long (1 1/2 to 2 hour) boat ride from Hilo, Leleiwi Point or Kings landing. They also feel that the entrance channel at Kumukahi will be more sheltered than other sites from northerly storms.

RECREATIONAL.

The Reeds Bay project (Figure 6) was authorized in 1965. It was not constructed because the harbor configuration would adversely affect existing recreation areas. Changes to the project design were necessary to preserve two popular recreation areas, Reeds Bay Beach and Ice Pond. An alternative (see Figure 7) plan evolved from reevaluation and discussion at the workshops.

Reeds Bay Small-Craft Harbor was originally one of eight projects recommended by the District Engineer in the "Interim Report on Survey of the Coasts of the Hawaiian Islands, Harbors for Light Draft Vessels," prepared in 1963 and authorized in 1965. The project held a low priority in the State of Hawaii Harbors Division capital improvements program because local interests were concerned that water contact recreation for children not be lost at the site due to the harbor construction. On January 15, 1976, a public meeting for deauthorization of the project was held. Local interests requested that the authorization of Reeds Bay should be retained, but that the project be relocated or reconfigured.

As population, income and leisure time increase, a greater demand now exists on the existing small-craft facilities in Hawaii County. Excess demand for wet storage in the Hilo area was over 90 recreational craft in 1980. A small craft harbor could be constructed at this site which would assist in satisfying the recreational and commercial boating needs in Hilo for wet storage as well as trailered boats.

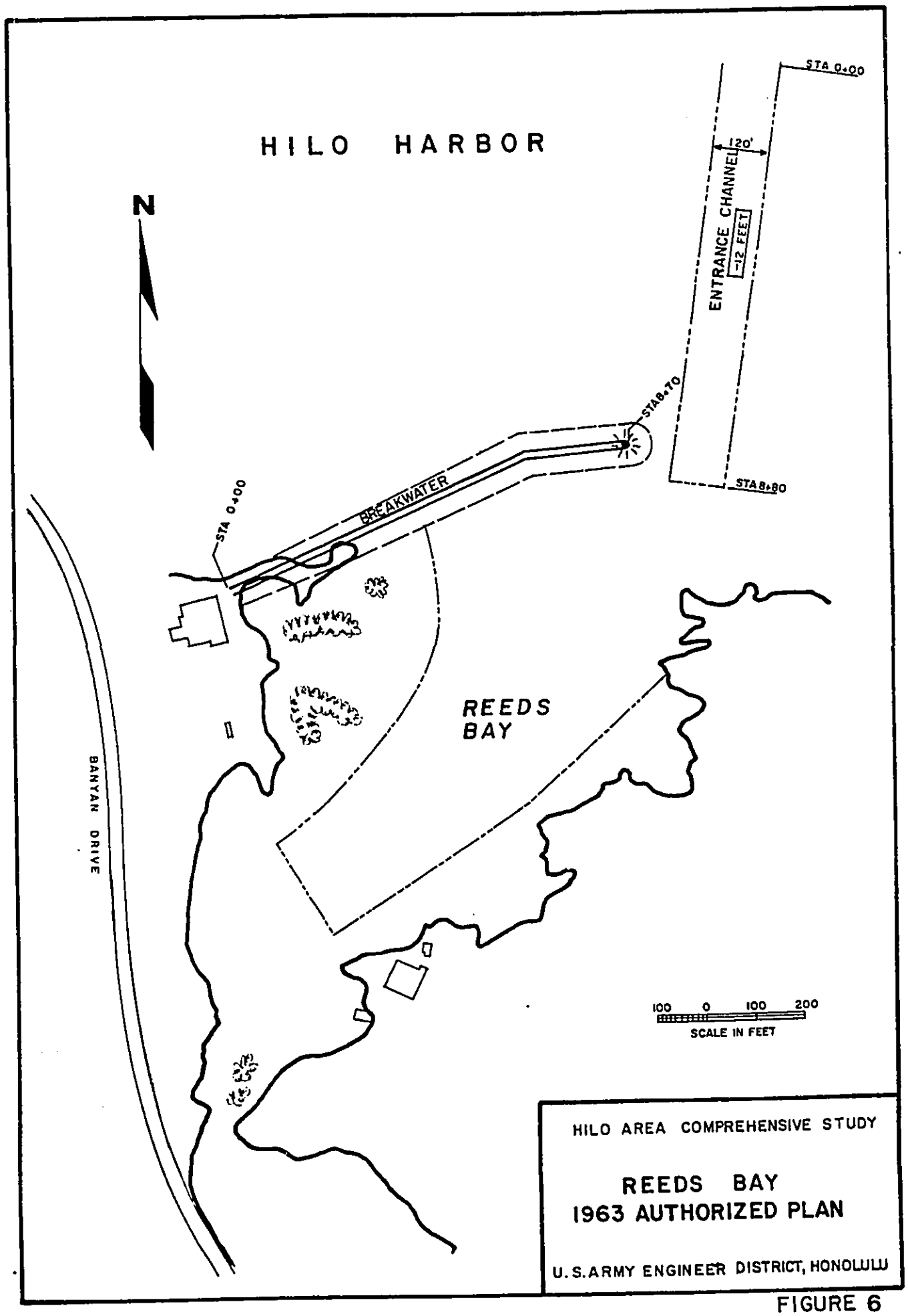

HILO HARBOR
N
STA 0+00
20'
ENTRANCE CHANNEL
-12 FEET
STA 8+70
STA 8+80
BREAKWATER
STA 0+00
BANYAN DRIVE
REEDS
BAY
100 0 100 200
SCALE IN FEET
HILO AREA COMPREHENSIVE STUDY
REEDS BAY
1963 AUTHORIZED PLAN
U.S.ARMY ENGINEER DISTRICT, HONOLULU

FIGURE 6

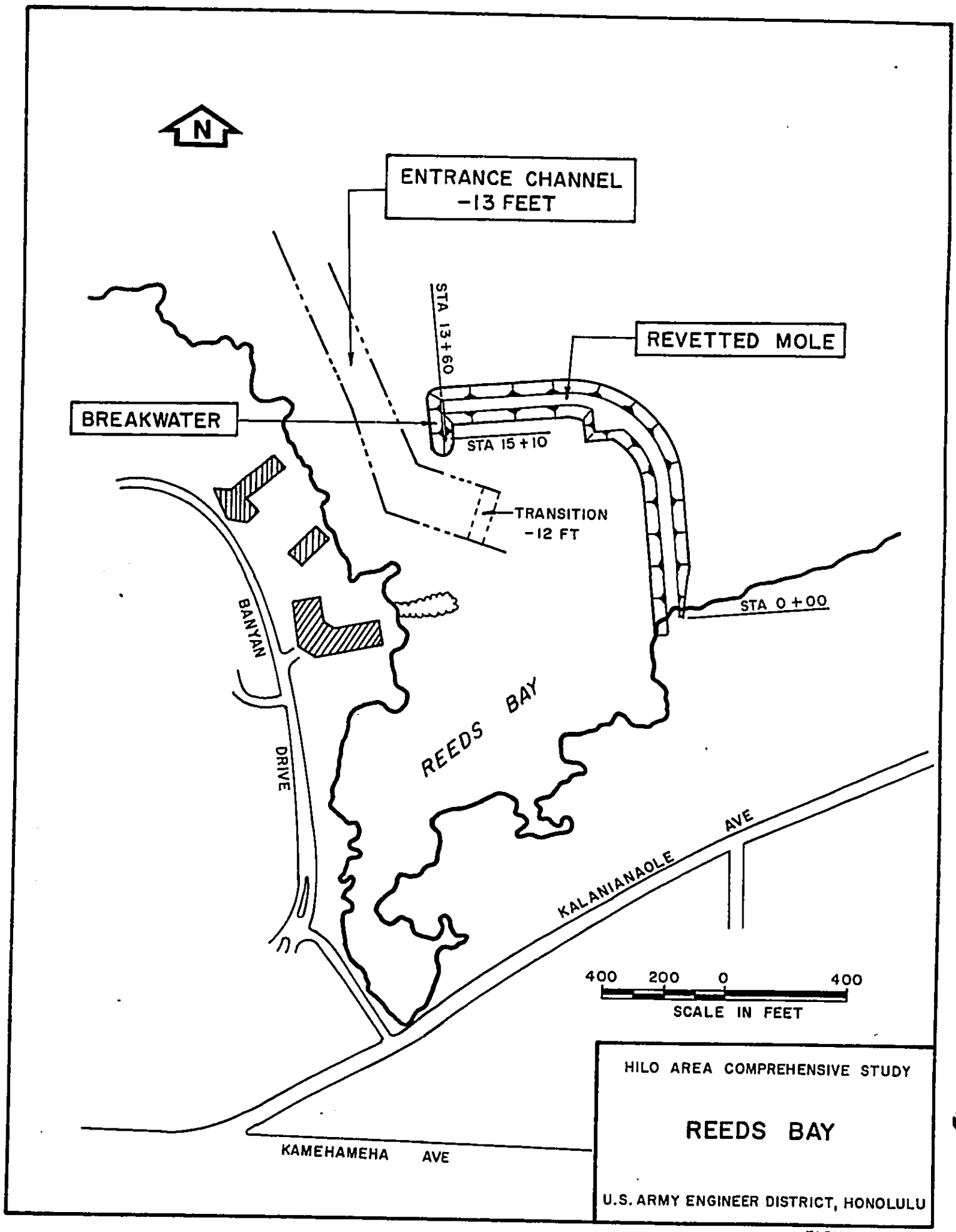

N
ENTRANCE CHANNEL
-13 FEET
STA 13+60
REVETTED MOLE
BREAKWATER
STA 15+10
TRANSITION
-12 FT
STA 0+00
BANYAN
DRIVE
REEDS BAY
KALANIANAOLE
AVE
400 200 0 400
SCALE IN FEET
KAMEHAMEHA AVE
HILO AREA COMPREHENSIVE STUDY
REEDS BAY
U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE 7

The major objectives of the study were to provide appropriate facilities to meet these berthing needs and to minimize environmental modifications to terrestrial and marine environments.

Under the current comprehensive study, a revised configuration was prepared and the costs and benefits reanalyzed. The tentative plan (Figure 7) improves conditions for recreational small-craft berths and would provide for 100 boats between 25 feet to 35 feet in length; 2 to 4 launch ramps; a roadway for vehicular access to the berths; and, shoreside facilities for parking and support activities. The total first cost of this project would be $3.3 million and has a benefit-to-cost ratio of 2.3. A letter of support was received from the State Department of Transportation (August 11, 1982) which requested the Corps to reactivate the Reeds Bay Small Boat Harbor project.

COMMERCIAL.

Cape Kumukahi is 25 miles southeast of Hilo and protects the site from direct exposure from north sea swells and trade winds. The site is on State and Federal lands which are sparsely vegetated and uninhabited.

In east Hawaii, access to the ocean for boaters is especially difficult due to trade wind exposure and the rugged coastline. The needs expressed by the boating public indicate a need for small-craft berths, harbors of refuge, protected mooring areas for fish offloading and vessel resupplying, and launch ramps for trailered boats. The significant increase in commercial fishing is making the need for facilities to serve those boaters particularly acute. Hilo Bay is the only all-weather harbor in east Hawaii. However, depending on the locations of the fish runs, Hilo may be far from the best fishing grounds. Due to the lack of area for major backup facilities, expansion of Hilo Bay has limited small-craft facilities and expansion of the commercial operations is constrained.

The coast of East Hawaii has three main problems: a rugged coastline; a trade wind exposure north of Kumukahi; and an excess demand for harbor facilities due to the rapidly growing commercial fishing industry.

The following objectives were established for the study: support the needs of commercial and sport fishing along the coastal zone of east Hawaii by providing new and expanded small-craft harbor facilities; and, contribute to the overall safety of commercial and recreational boating in east Hawaii by providing refuge facilities for shelter from storms and other emergencies.

Figure 8 shows the tentative plan which would provide for berths for 165 boats varying between 25 to 35 feet in length; 2 to 4 launch ramps and land area for full development of a commercial fishing industrial complex. The harbor depth would be 12 feet and the entrance channel 15 feet. The total cost is $21.4 million. The benefit-to-cost ratio would be 1.6.

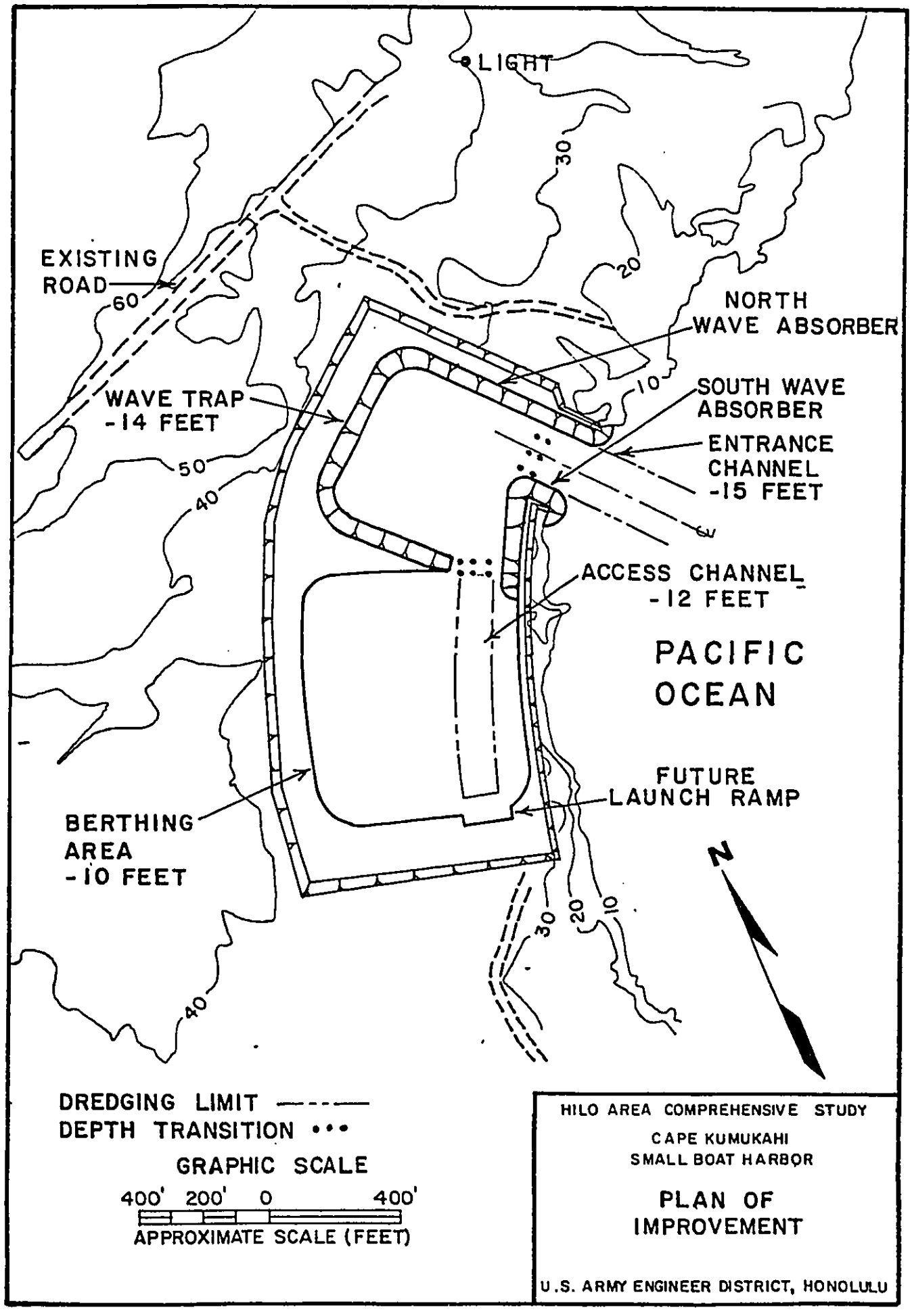
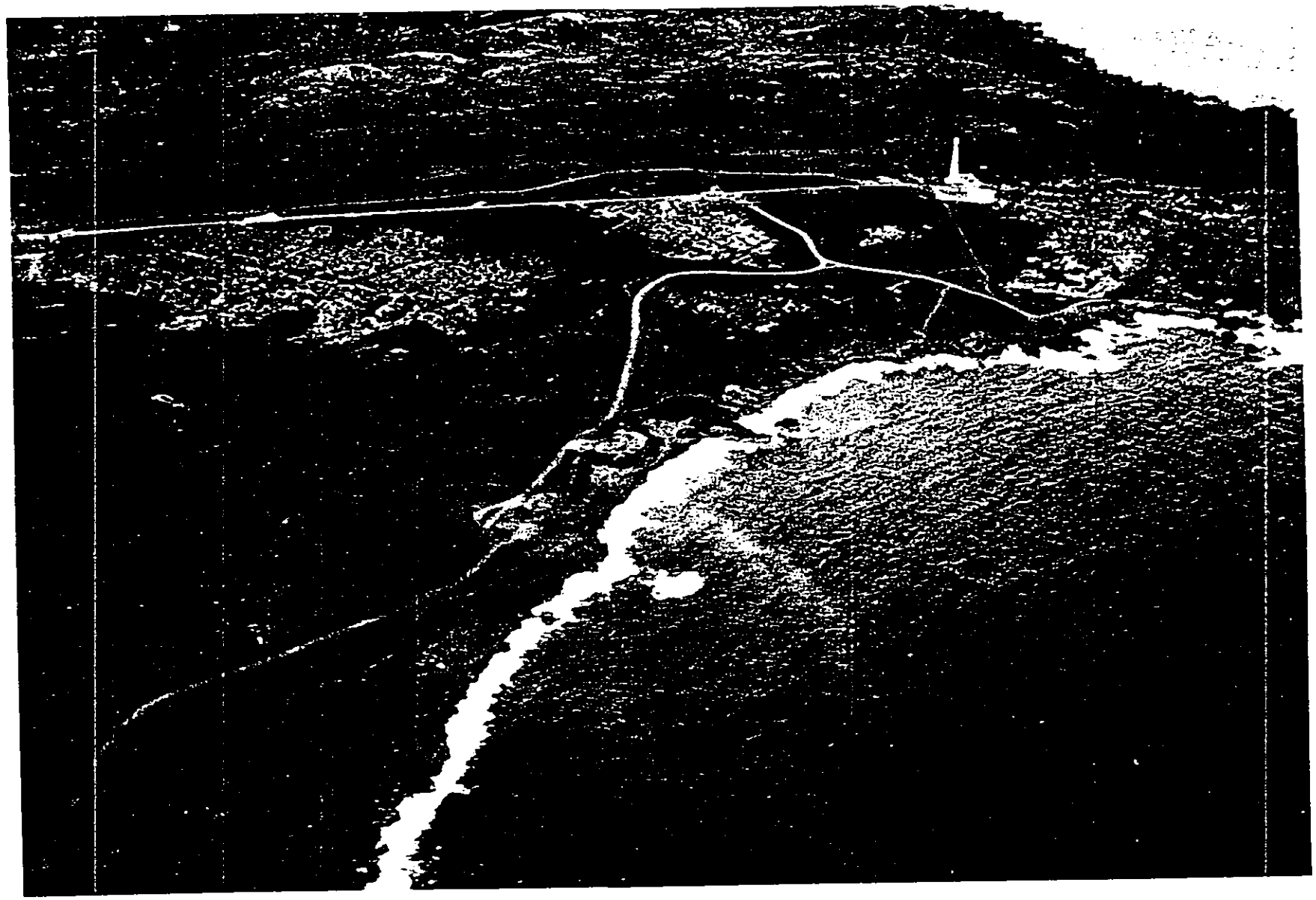

LIGHT
30
20
10
EXISTING ROAD
60
NORTH WAVE ABSORBER
SOUTH WAVE ABSORBER
WAVE TRAP -14 FEET
50
40
ENTRANCE CHANNEL -15 FEET
ACCESS CHANNEL -12 FEET
PACIFIC OCEAN
FUTURE LAUNCH RAMP
BERTHING AREA -10 FEET
N
DREDGING LIMIT
DEPTH TRANSITION
GRAPHIC SCALE
400' 200' 0 400'
APPROXIMATE SCALE (FEET)
HILO AREA COMPREHENSIVE STUDY
CAPE KUMUKAHI
SMALL BOAT HARBOR
PLAN OF IMPROVEMENT
U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE 8



Small Craft Navigation (Commercial)

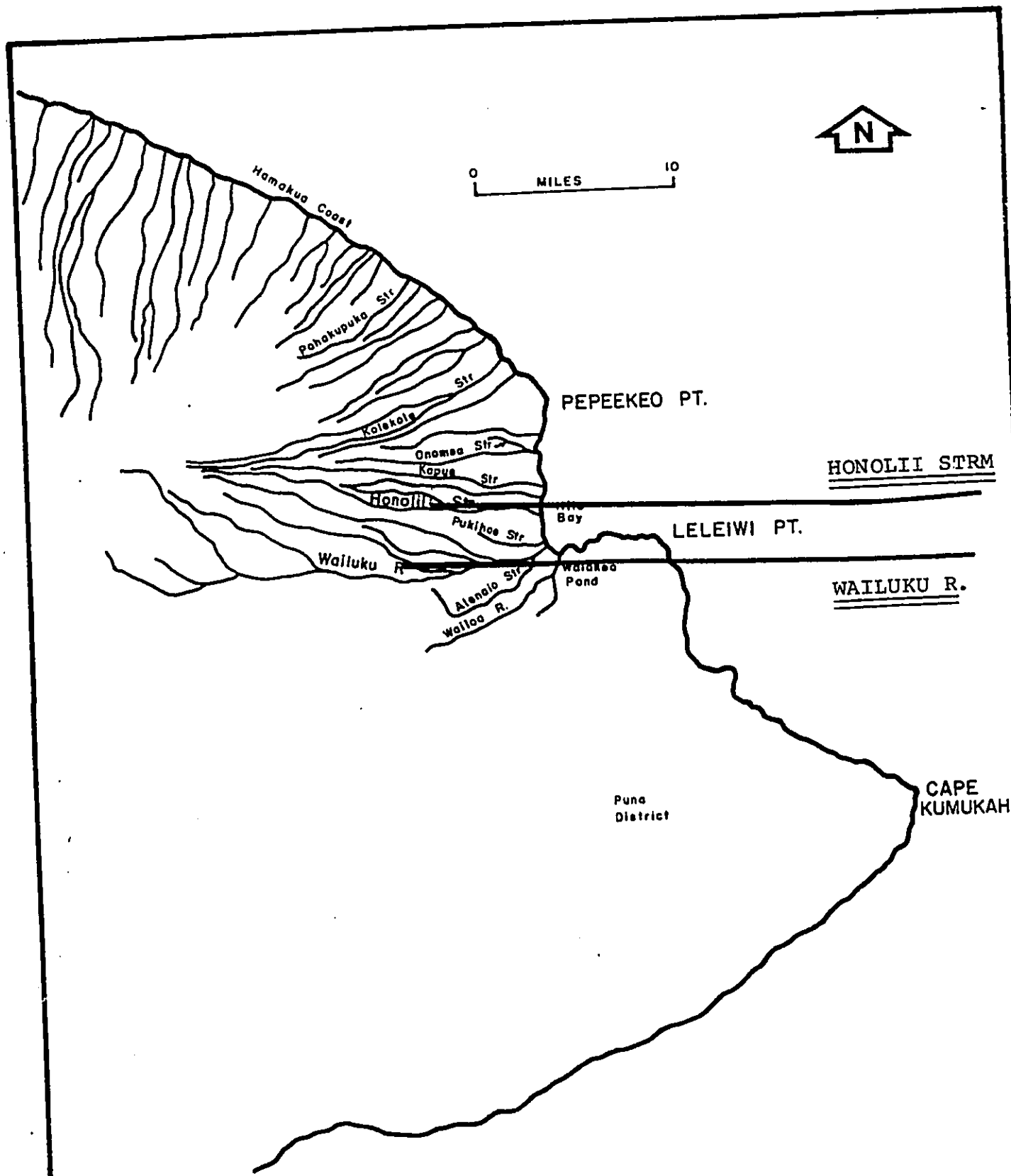
Cape Kumukani

E. HYDROPOWER DEVELOPMENT.

The study recommends further investigation of the feasibility of hydropower development on the Wailuku River and Honolii Stream (Figure 9) located on the eastern coast of the island of Hawaii. In response to a request by the State of Hawaii Department of Planning and Economic Development, a reconnaissance study to assess the hydropower potential of the Wailuku River and Honolii Stream was completed in June 1982.

The preliminary investigation showed that small-scale run-of-the-river hydropower facilities on the Wailuku River and Honolii Stream are feasible and offer a practical solution to energy problems. In view of the rapidly escalating costs of electricity generated by fueled energy sources, and the favorable economic opportunity for resource conservation and use of renewable resources, a detailed feasibility study for hydropower development on the Wailuku River (Figure 10) and Honolii Stream (Figure 11) is warranted.

The reconnaissance study showed the run-of-the river hydropower capabilities for three potential sites: one of the sites was on the Wailuku River and two on Honolii. Without the development of alternate energy sources, the State of Hawaii will be almost wholly dependent upon imported petroleum products for generation of power in the public utility system. Hydropower plants on the Wailuku River and Honolii Stream could contribute up to 10 percent of the 1990 electricity demand projection on the Big Island.



Perennial streams, in the Hilo study area.

FIGURE 9

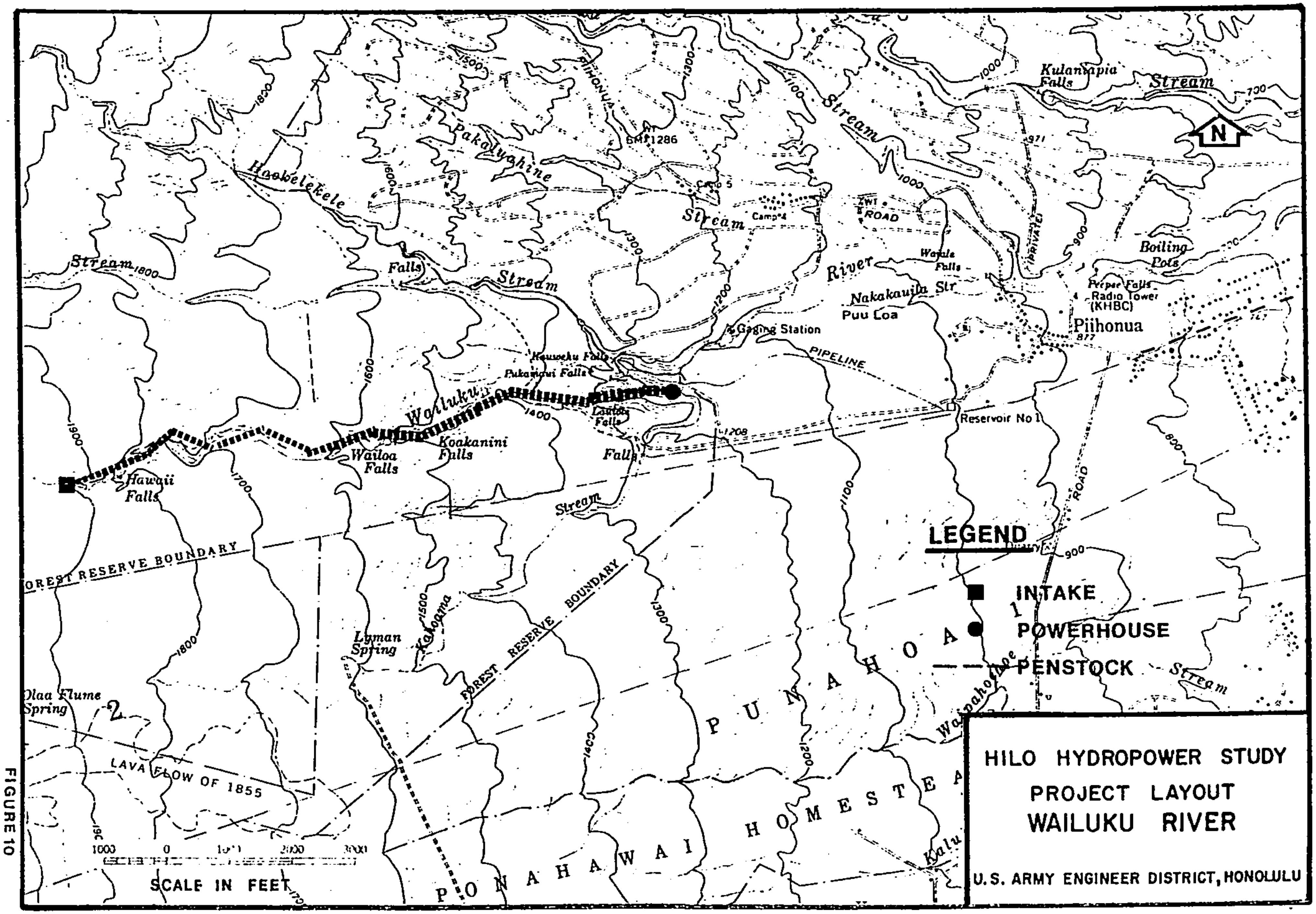

HILO HYDROPOWER STUDY
PROJECT LAYOUT
WAILUKU RIVER
U.S. ARMY ENGINEER DISTRICT, HONOLULU
LEGEND
INTAKE
POWERHOUSE
PENSTOCK
SCALE IN FEET
Wailuku River
Hawaii Falls
Wailoa Falls
Koakanini Falls
Kaluweku Falls
Pukaunui Falls
Lauka Falls
Falls
Stream
Pakaluahine Stream
Hoobelekele Stream
Kalaoama
Lyman Spring
Olaa Flume Spring
LAVA FLOW OF 1855
FOREST RESERVE BOUNDARY
PUNAHOA
PONAHAWAI HOMESTEAD
Gaging Station
PIPELINE
Reservoir No 1
ROAD
(PRIVATE)
Nakakauila Str
Puu Loa
Waiale Falls
Piihonua
Radio Tower (KHBC)
Pepee Falls
Boiling Pots
Kulaniapia Falls
Stream
Waipahoehoe
Camp 4
Camp 5
BM 1286
N

FIGURE 10

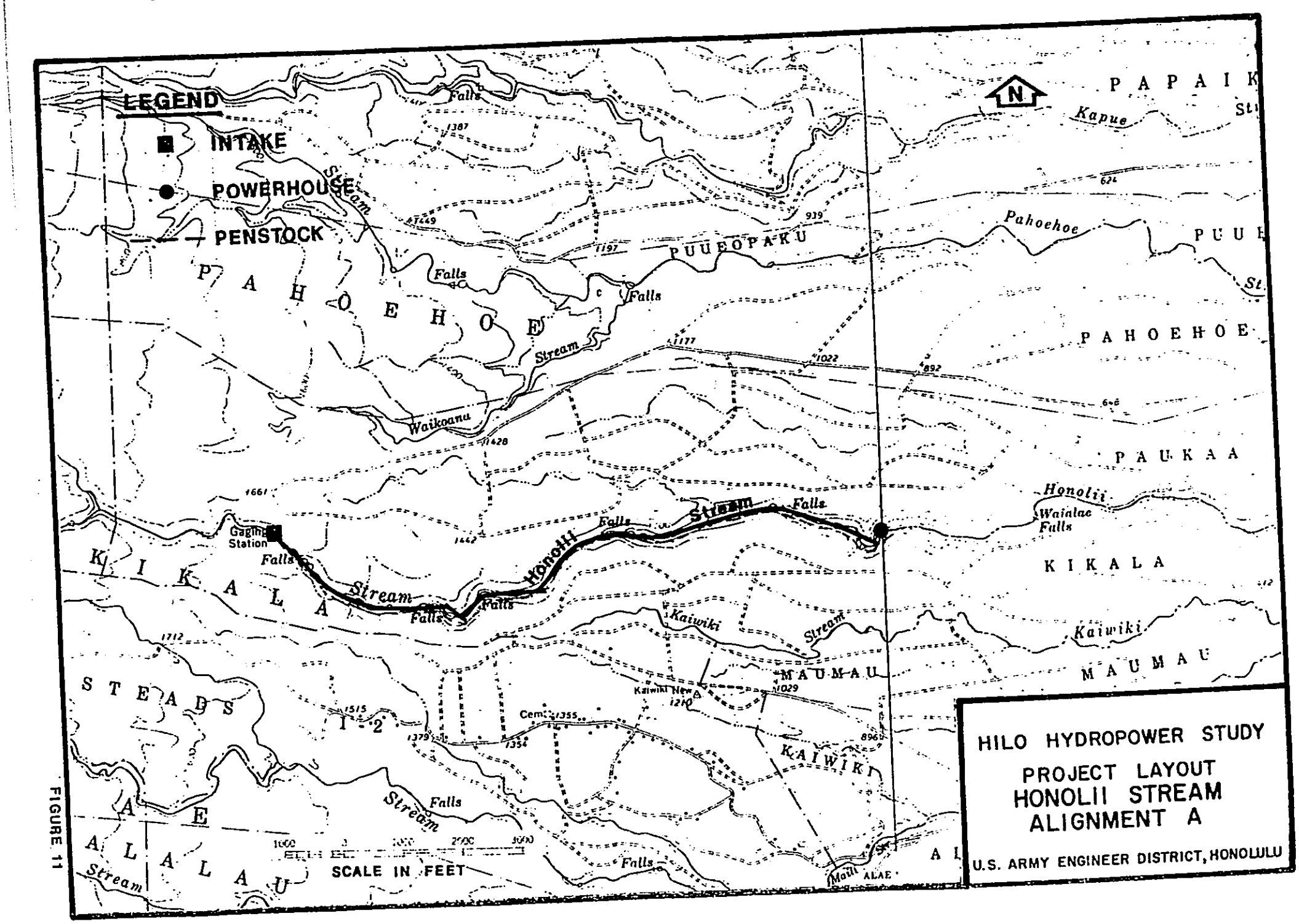


FIGURE 11

HILO HYDROPOWER STUDY

PROJECT LAYOUT
HONOLII STREAM
ALIGNMENT A

U.S. ARMY ENGINEER DISTRICT, HONOLULU

F. FLOOD DAMAGE REDUCTION.

The following plan (Figure 12) was prepared for use by the County of Hawaii in their efforts to ease local flooding problems at Hilo, Hawaii. The plan takes seven areas into consideration - three drainage system areas, three channel improvement plans, and one nonstructural plan. It was planned and developed on a scale that the local government could implement.

The following is a brief abstract of the recommended plan:

a. Area I. This area lies south of Haihai Street and includes the construction of small ditches on ten streets in order to collect runoff and direct it to Haihai Street. An improved drainage ditch along Haihai Street would then channel the water to Palai Stream. These improvements would cost approximately $1.2 million.

b. Area II. Area II is north of the Hilo Municipal Golf Course and consists of four new drainage ditches that would route runoff to Kawailani Street. At Kawailani Street, another drainage ditch would be upgraded to safely remove the water from the area. The total cost is estimated at $590,000.

c. Area III. This area is in Kawailani Place and includes constructing three new dry wells and placing three pipelines which would connect all of the new and existing drywells at an estimated cost of $490,000.

d. Channel Improvement I. Waiakea Stream would be improved to carry a 2% 1/ Flood Event. Two sections of channel would be worked on a 4,100-foot section downstream of Kapulau Road and a 4,400-foot section upstream of Komohana Street at a cost of $2.4 million.

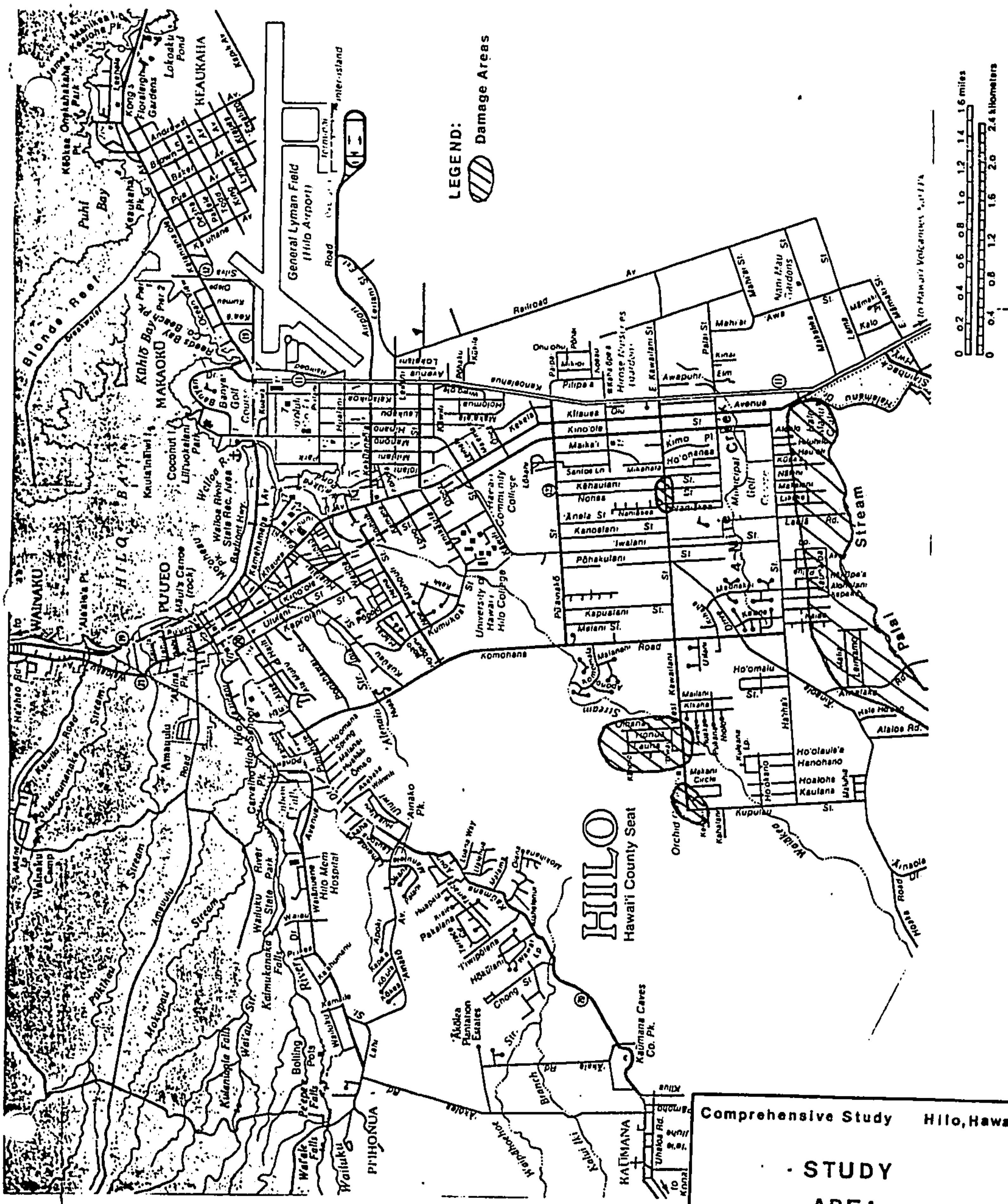
e. Channel Improvement II. Palai Stream would be improved to carry a 2% Flood Event. In addition, 12,000 feet of the Palai Stream would be improved with an additional improvement of 2,800 feet to a side channel. These improvements have been estimated at $1.3 million.

f. Channel Improvement III. This is an extension of a cutoff channel west of Kapulau Road. The channel would be extended 1,400 feet to intercept runoff before it reaches the urbanized area. The estimated cost is $113,000.

g. Nonstructural Plan. The nonstructural plan involves the application of flood-proofing techniques to about 40 structures west of Kapulau Road. The plan would also place a total construction ban on any structural improvements in a floodway to eliminate potential damages to structures, and a ban on slab-on-grade construction in the 100-year 2/ floodplain or a sheet flow hazard area.

1/ 2% Flood Event. A flood event that has a 2% chance of occurring in any one year, or on the average of once in in every 50 years.

2/ 1% Flood Event. A flood event that occurs on the average of once every 100 years or a flood event that has a 1% chance of happening during any one year.



Comprehensive Study Hilo, Hawaii

STUDY AREA

Figure 12

U.S. Army Engineer District, Honolulu

Each plan is independent from one another; therefore, the order of work for construction of the various segments is not too critical. The following outlines what is the preferred sequence:

1st	2d	3d
Area II	Area I	Palai
Waiakea	Area III	Extension (nonstructural)

The total recommended plan would cost about $6.4 million.

The result of this plan would be protection of the urban area from flood damage during the more frequent flood events. In the future, it would also protect urban expansion by keeping all structures away from a stream by restricting the building of structures in flood-prone areas.

G. RECREATION AND FISH AND WILDLIFE.

Recreation in prehistoric and early historic Hilo focused in large part on Hilo Bay. Kelly's 1981 history of Hilo Bay, prepared for this study tells of the great popularity of surfing, swimming, fishing and boating. Today, poor water quality in Hilo Bay limits swimming mainly to Ice Pond, south of Reeds Bay. Kelly, et.al. identified eleven surfing sites in the Hilo Bay area: Kahaia (1), Aleakea Point (1), Wailuku River (2), Coconut Island (1), Hilo Breakwater (3), and Puhi Bay (3). Cheney's 1977 investigation for this study found concentrations of recreational shoreline fishermen in Waiakea Pond, between Wailoa River mouth and Coconut Island, near Radio Bay and the mouth of Wailuku River as well as along the Hilo Breakwater. Limu (algae) is collected for bait particularly in Reeds Bay and Ice Pond. There are 54 small-craft berths at Wailoa River State Park, 16 anchor moorings for sailboats in Reeds Bay, and 11 berths and anchorage for about ten additional craft in Radio Bay, mostly used by transient craft and commercial fishing boats. Total moored craft capacity is 106 spaces for the area.

The 1975 State Comprehensive Outdoor Recreation Plan (SCORP) survey of recreation demand found 37 percent of island recreation activity occurs within the Hilo planning area where 54 percent of the county's population then lived. Swimming/sunbathing ranked highest at 26 percent of all activities. Fishing ranked sixth (6 percent) and surfing and boating ranked tenth (3%) and eleventh (2%), respectively. Based on available supply, beach swimming/sunbathing and hiking showed the highest indicators for recreation facility need from 1975 to 1990. The 1980 State Recreation Plan updating the 1975 SCORP re-evaluated its need determination, but continued to show that the highest regional activity need was for swimming/sunbathing at beach parks throughout the county. Demand for boating from launch ramps was high in the short term for both Hilo and Puna but low in the long-term. The study indicated only low demand for boating from slips and moorages for Hilo through 1995 and for Puna (1985-1995). A more recent benefit analysis conducted by the Corps in 1980 for a Hilo light-draft harbor, using survey data, projected in contrast an excess demand in the study area for 163 moored spaces in 1980, 383 spaces by 1990 and 487 spaces by 2000, assuming unlimited capacity.

Overall, the 1980 State plan indicated great demand for available shoreline areas on the windward coast suitable for multiple recreation uses. It also recommended that beach park and other shore-line opportunities be developed in Puna for both the many Hilo residents traveling there for a portion of their coastal recreational needs as well as for communities in Puna and Ka'u.

A common theme during the past decade of County and State planning (1971 and 1975 SCORP, 1971 County General Plan, 1974 County Recreation Plan, 1975 Hilo Community Development Plan and 1976 (?) Keaukaha Shoreline Plan) has been the vision of a regional Hilo Bayfront-Keaukaha Shoreline beach park running from the inland wilderness experience of Kaumanu Springs Wilderness Park Reserve and Wailuku River State Park through Mooheau-Bayfront Park, with a restored blacksand beach, the Suisan area of Wailoa River State Park and Liliuokalani Gardens on Waiakea Peninsula, and the parks from Reeds Bay along the Keaukaha coast to Leleiwi-Lehia Point. Linking the park and open-space components would be a trail (pedestrian and bikeway) and access system. The 1979 draft Puna Community Development Plan extends this long-term concept in its proposed State-sponsored construction of a northern Puna coast scenic highway which would pass through coastal parks and boat/canoe landings to

Cape Kumukahi-Kapoho and beyond. The Hilo Community Development Plan recommends siting a marina on the east shore of Reeds Bay, but the Keaukaha Plan suggested a marina outside the mouth of Wailoa River.

To address the coastal recreation needs and dreams of the Hilo community, the Corps comprehensive study originally proposed to investigate the feasibility of developing an artificial surfing shoal in Hilo Bay and to provide recreation elements in other HACS study components (breakwater improvements, shore protection, recreational small-craft navigation, flood control, and water quality).

Of the two previously Congressionally-authorized projects, only the proposed Reeds Bay small craft harbor significantly contributes to the recreational needs of the Hilo area community. Navigational improvements to Hilo Harbor by deepening should not adversely affect shoreline or offshore fishing opportunities.

The Hilo Bayfront Beach and Kumukahi Small Craft Harbor are long-term projects requiring Congressional authorization, and are unlikely to be constructed until the 1990's. The beach restoration and shoreline protection project will provide a long-sought-for resource that was once the focus of Hilo water-contact recreation. Active swimming in the bay waters is unlikely to fully develop until the bay's water quality is improved in the long term, but levels of surfing, wading and sunbathing, and surf-casting should rise quickly. Shore fishing off the five groins may develop into a new fishery. The Kumukahi Small Craft Harbor does not have a formal recreation component, except for provision of four berths for transient boats. Although designated for commercial uses only, it may be perceived by the local community as a potential recreational asset, and in any case, will serve as a harbor of refuge for any recreational craft needing a safe haven in poor sea conditions.

At least two of the Hilo Area Comprehensive Study components may be viewed as strongly contributing to the concept of a regional, inter-district shoreline park system. The small-craft harbor at Reeds Bay will focus sailing and power-boat activity away from the canoeing near the mouth of the Wailoa River and the proposed surfing, wading/swimming, and shoreline fishing area at the new Hilo Bayfront Beach. Siting these Federal-State projects well apart from each other may also encourage local interests to provide the pedestrian and bikeway linkages and access to downtown areas needed for the success of the regional park concept. Further, construction of a major small-craft harbor at Cape Kumukahi may provide further encouragement to eventual development of a direct scenic highway link between Kapoho, Kings Landing and the Keaukaha-Hilo area. Hilo Bay and the Puna coast of the Island of Hawaii support significant recreational and commercial fisheries. Commercial fishing in Hilo Bay is limited to the capture of Nehu (Stolephorus purpureus) to be used as bait for the skipjack tuna fishery. The bay is however an important area for recreational fishermen without boats, and most of the fishing is by pole and line from shore, docks and the breakwater. The area off the Puna coast is a popular fishing ground for commercial and recreational fishermen with boats, in spite of the generally rough sea state in that area.

One of the objectives of the Hilo Area Comprehensive Study was the "...enhancement and conservation of fish and wildlife...", and earlier studies conducted as part of HACS contributed to the enhancement of fish and wildlife by preparing inventories of the biota and habitats in Hilo Bay and other nearby areas being considered for possible projects. The present studies at

Reeds Bay, Cape Kumukahi and the Hilo Bayfront Beach area have concentrated on eliminating or reducing adverse impacts to fish and wildlife resources from the proposed projects.

Short-term impacts such as reduced access to fishing sites and increased water turbidity will result from construction activities, but these impacts are not expected to effect any of the project areas after completion of construction. Both the Reeds Bay area and the Hilo Bayfront Beach area are biologically depauperate, and no adverse impacts are expected from the projects proposed for those areas. The Cape Kumukahi area, however, is in the rich Puna coast fishing grounds and development of a harbor for commercial fishing vessels there will increase access to those grounds. The increased access by both commercial and recreational boats is expected to result in more fish being harvested from the Puna and Ka'u coasts. The harbor will also provide sites for shore fishermen as soon as the new marine habitat which is created is colonized by corals and other invertebrates, and fish. No endangered or threatened species will be adversely impacted by any of the proposed projects, nor will they result in any significant adverse impact on other fish and wildlife resources.

H. WATER QUALITY.

Another important study component conducted under the Hilo Area Comprehensive Study was water quality. The study, which was completed in October 1980, provided a basis for evaluating the impact of Hilo Bay projects being considered by the US Army Corps of Engineers and addressed the ambient geological, biological, and water quality characteristics of Hilo Bay.

The proposed projects and accompanying alternatives being considered include dredging of the entrance channel and harbor basin, construction of a small boat harbor, restoration of the Bayfront Beach, the construction of surfing shoals, and alteration of the configuration of the breakwater. The water quality in Hilo Bay and the quality of beaches around the bay are less attractive to vacationing visitors than those in other locations in the State.

Hilo Bay is recovering from a 75-year period of pollution stress, heavy metals, including the discharge of pollutants, pesticides, and organic wastes, into the bay. The sources of this pollution no longer exist. Except for contaminants which reside in bay sediments, only Hilo's Breakwater remains as a significant factor in water quality. The breakwater reduces circulation in the bay, exchange of water with the ocean, and traps significant quantities of fresh flowing water from underground springs along most of the shoreline.

The report studied the circulation characteristics of Hilo Bay under various tide, wind, and fresh water inflow conditions in order to evaluate the probable effects of proposed projects for that area. It also covered the water quality characteristics of the bay under various seasonal and weather conditions in order to document historical trends and to determine the relative effects of proposed projects. The data resulting from the various investigations were analyzed and the physical, chemical, and biological interactions discussed. The proposed projects were also evaluated using information developed during the study.

SECTION II

COORDINATION AND PUBLIC VIEWS

INTRODUCTION

The public involvement program of the Hilo Area Comprehensive Study consisted of three interwoven elements:

a. Meetings and workshops with the public at large.

b. Meetings and workshops with members of Federal, State, and local agencies.

c. The various reports and documents publicly distributed to report the study's progress.

Beginning with the initial public meeting in April 1976, numerous public meetings and workshops were part of this public involvement program. The next section discusses these meetings and workshops, including a summary of each. The remainder of this section contains a discussion of each of the reports and other documents thus far produced in the study relating to navigation.

MEETINGS AND WORKSHOPS

INITIAL PUBLIC MEETING (27 APRIL 1976)

Summary of Meeting

Staff members of the Honolulu Engineer District discussed aspects of the proposed comprehensive study. The general tone of comments received was support for the study. The attendees, about 80 total, included representatives of Hawaii's Congressional delegation, officials of Federal, State and County agencies, members of community groups, and individuals. A representative of the State of Hawaii presented a statement noting the State expected the study to be the basis for fulfilling the requirements of Section 208 of PL 92-500.

SMALL-CRAFT NAVIGATION WORKSHOP (23 MAY 1977)

Summary of Workshop

This workshop and the workshop following in June were used to obtain community input on an array of potential Small Boat Harbor sites. The attendees at this meeting discussed the merits of all sites, selecting those most favorable from the user's point of view. Following presentation of videotapes of the sites, no objection was raised to any site except Kapoho. Shore fishermen expressed concerns about possible adverse effects of new boating facilities on shore casting, particularly at Kapoho, but also at Pohoiki, to a lesser extent. Boaters expressed the need for more facilities at Laupahoehoe, Hilo, and in Puna. With no safe harbors north of Hilo in rough weather, Laupahoehoe was asked to be considered for development as a harbor of refuge. The needs existing at the Wailoa basin were mentioned: more berths, more parking, and the bridge that restricts entry to the basin. It was stated that a launch ramp could be located adjacent to the Hilo Iron Works. If the Pohoiki ramp were to be protected, boaters in Hilo indicated they would use Pohoiki more frequently.

SMALL-CRAFT NAVIGATION WORKSHOP (13 JUNE 1977)

Summary of Workshop

The videotape shown at the previous meeting was used as an introduction, then the status of the sites was given: Seven had been deleted from further consideration for a variety of reasons. One site deleted, Pohoiki--the site of another Corps study--specifically received a good deal of attention. The boaters were concerned that deletion from consideration would be harmful to the project. (The Pohoiki breakwater project was completed in 1979.) As compared to the first meeting, people representing a broader range of interests attended: State and County officials, an environmental representative, as well as many of the boaters and fishermen that attended the meeting in May.

Laupahoehoe received much support. Supporters from there presented a film showing the difficulties in launching at Laupahoehoe with a north wind and again requested consideration of Laupahoehoe as a harbor of refuge. The problems of Waiakea Peninsula were discussed: tremendous tsunami force, encroachment on view, interference with fishing, and possibility of further reducing the black sand beach by changing the littoral drift. The bayfront harbor site has the same tsunami problems, would interfere with canoe racing, and would directly remove some of the black sand beach. Expressed concerns for Wailoa River were the highway bridge is too low, a fuel dock is needed, and there are potential adverse environmental effects. Reeds Bay, a site of an approved Corps SBH, was the group's choice for the Hilo area. Of the conceptual alternatives presented for Reeds Bay, number two has better access for sailboats. One person in attendance expressed concern that the Corps apparently was neglecting the Chamber of Commerce plan for developing Hilo Harbor.

(Note: An engineering and economic feasibility study of a small project is presently being prepared by the Honolulu Engineer District under a different authority than the Comprehensive Study.)

SMALL CRAFT FACILITIES WORKSHOP (26 APRIL 1978)

Summary of Workshop

This workshop was combined with a workshop for State-sponsored study of mooring sites which was also in progress at that time. The results of the reconnaissance studies for navigation at Laupahoehoe, King's Landing and Lehia Park were given. A summary of past small-craft facility planning was given, followed by a discussion centering on the Hilo area.

Comments on the Wailoa site included the feeling that this site is more protected, would be less expensive to develop, freshwater in river is advantageous for boat maintenance, and that it would be cheaper to upgrade the restrictive highway bridge than to construct breakwaters at other sites. Reeds Bay received several comments: lands for access to Reeds Bay would be expensive, surge is a problem at Reeds Bay (as well as Hilo Harbor), and Reeds Bay should be preserved as a beach for visitors. A general comment was that more centralized facilities are needed as a deterrent to the increasing vandalism.

DEEP-DRAFT AND SMALL-CRAFT NAVIGATION WORKSHOP (28 FEBRUARY 1980)

Summary of Workshop

The purpose of the workshop was to discuss the status of the Comprehensive Study as a whole; to discuss the various alternatives possible at Baker's Beach, as opposed to some other site farther south; and to discuss the possible changes to the deep-draft harbor. Attendees at the workshop represented a good cross section of public agencies and the general public; fishermen were not as well represented.

The general reaction to the Baker's Beach proposals was favorable, but commercial fishermen stated preference for any site farther south, closer to the best fishing grounds. The Hawaii Fire Department rescue squad wanted a launch ramp outside the breakwater to facilitate rescue operations at sea. Their feeling was that the wave conditions are better at King's Landing than at Puhi Bay, just outside the breakwater. There was opposition to creating a channel through the breakwater near Radio Bay. Such a channel would be extremely hazardous in high waves, and could present a dangerous attraction to boaters trying to get inside the harbor in bad weather. The consensus was that an alternative on the Puna Coast should be looked at further.

PUBLIC MEETING - DEEP-DRAFT AND SMALL-CRAFT NAVIGATION (20 AUGUST 1980)

Summary of Public Meeting

Attendance at this meeting was the largest of any meeting since the 1976 meeting initiating the study. The purpose of the meeting was to discuss deep-draft/small-craft navigation plans and the status of the Comprehensive Study. The Corps presentation, because of concern expressed about tsunami hazard and tsunami protection, included the history of the POD tsunami protection barrier for Hilo and its deauthorization in 1977; status of the bayfront beach restoration; water quality of Hilo Bay; deep-draft plans and small-craft plans, including an overview of all sites examined earlier and a presentation of the concepts of the two plans considered feasible. It was emphasized that all plans were preliminary.

SMALL-CRAFT FACILITIES WORKSHOP (11 FEBRUARY 1981)

Summary of Workshop

The purpose of this workshop was to discuss small-craft facilities and potential sites for new small boat harbors for Hilo and East Hawaii specifically:

Laupahoehoe - construction of stub breakwater

Bakers Beach - construction of recreation SBH

Leleiwi, King's Landing, Kapoho, and Kalapana - construction of SBH at one of these sites, principally commercial fishing

The workshop was extremely well attended, rivaling the attendance of the two public meetings (1976 & 1980) held in conjunction with the main comprehensive study. Because no residents from the Kalapana/Kapoho areas attended, consideration was given to conducting a subsequent workshop in one of those areas.

In response to earlier comments that a SBH was needed nearer South Point, the sites at Kalapana and Kapoho were added to the array of possible sites under examination as part of the comprehensive study. Leleiwi Point, added as an alternative to King's Landing, was also discussed.

The sites at Kalapana and Kapoho were generally favored (keeping in mind that no residents of those areas attended) because of the calmer offshore conditions. The conditions at King's Landing/Leleiwi Point were thought to be too rough to be safe for small boats. Because the best fishing grounds are more south from King's Landing/Leleiwi Point, some fishermen preferred the other sites. Other fishermen, because they fish both north and south from Hilo, thought a SBH in the King's Landing/Leleiwi Point area would be ideal.

Other comments:

Dredging needed at mouth of Wailoa River

Earlier alignment of breakwater at Reeds Bay preferred to that presented

Baker's Beach should not be used as backup for SBH inside Hilo Harbor - homeowner leases had just been renewed in Baker's Beach area

Radio Bay could not be used for small-craft berthing as the State is still planning to fill Radio Bay for more container storage

Better navigation aids needed at Pohoiki - approach and entrance are hazardous for those unfamiliar with Pohoiki

SMALL-CRAFT FACILITIES WORKSHOP (18 MARCH 1981)

Summary of Workshop

The potential for siting a small-boat harbor at King's Landing, Leleiwi Point, Kapoho, and Kalapana was discussed. Those attending were unanimous against any development at Kapoho. There was general agreement that Kalapana would make a good site for a small-craft harbor. The feelings about a harbor in the King's Landing/Leleiwi area were mixed.

Comments Received During the Meeting

Most of the comments were specific statements against locating the harbor at Kapoho, however, it was suggested that the Corps examine new sites at Pohoiki, which would be an offshore harbor, and on the coast next to Queen's Bath, just south of Kalapana, which would be an inland site very similiar to the other sites under consideration.

PUBLIC MEETING - DEEP-DRAFT AND SMALL CRAFT NAVIGATION (17 SEPTEMBER 1981)

Summary of the Public Meeting

One hundred twenty people attended this meting to discuss their review of a draft report and environmental impact statements for improvements to Hilo Harbor and construction of a new small-craft harbor. The result of the meeting was strong support for improvement to Hilo Harbor and a general rejection of small-craft harbor construction at Leleiwi Point, King's Landing or Kalapana.

There was general support for improving Hilo Bay's water quality but caution was advised if the breakwater was to be modified because of potential tsunami impacts.

The restoration of the Hilo Bayfront beach was seen as a good idea although some of the audience criticized large expenditures in the face of bad economic times.

A modified Bakers Beach/Reeds Bay harbor configuration was suggested which could be acceptable to the community.

SMALL-CRAFT HARBOR WORKSHOP (4 FEBRUARY 1982)

Summary of Workshop

In order to find a site for a new small-craft harbor in Plan A acceptable to local government and commercial fishermen, a workshop was held for them and other interested parties. This workshop concluded with Cape Kumukahi on the south side as the recommended site. This site had protection from northerly and easterly storm waves since it was in the lee of Kumukahi.

ENTIRE COMPREHENSIVE STUDY WORKSHOPS (30 NOVEMBER 1982)

Summary of Workshops

Duplicate workshops were held at 10:30 AM in the Wailoa State Park and at 7:00 PM at the State Office Building. The workshops described proposals to modify the Hilo Breakwater for water quality improvements; to restore the Bayfront Beach; to construct small craft harbors at Reeds Bay and Kumukahi. These were well attended workshops provided for public information. There was general approval of the proposals.

DOCUMENTS PRODUCED DURING STUDY

Baseline Environmental Investigation of Hilo Harbor, Summer 1972

This report contains a summary and an analysis of selected physical, chemical, and biological conditions characterizing the waters of Hilo Harbor during July and August 1972. An attempt was made to compare the data collected during this investigation to available historic data, but the comparisons have limited value because previous studies were limited in scope and of short duration. The report provides a summary and analysis of agency development plans that could directly impact on the environment of the harbor. Recommendations are included for future evaluation of the physical, chemical, and biological conditions of the harbor.

The study that produced the results presented in this report was funded by POD's broad Harbors and Rivers in Hawaii authority (Public Law 84-874, Section 209). The report was reproduced and distributed using funds from the Hilo Area Comprehensive Study authority, and, because of this, the report is included as a document produced during the comprehensive study.

Plan of Study, Hilo Area Comprehensive Study, December 1976

This report, while funded under the Harbors and Rivers authority, was the first formal report of the comprehensive study. The Plan of Study presented a preliminary identification of the problems of the water and water-related land resources in the Hilo area and addressed the need for a comprehensive study. The report presented activities that should be performed in the study and a schedule for accomplishing those activities. The problems of the Hilo Bay area as listed in this report included both deep-draft and shallow-draft (small boat) navigation needs.

Hilo Harbor First Spring Season Environmental Studies, August 1977

The purpose of this study was to describe existing ambient conditions of Hilo Bay--water quality, beach and biological conditions, prevailing weather conditions, and freshwater inflows. Included in the study were examination of circulation and stratification of the waters, measurements of water quality parameters inside and outside the harbor, marine biology surveys, a fish catch inventory, observation of littoral sand transport, and collection of meteorological and hydrological data. The information gathered in this study was evaluated and compared to data collected earlier, particularly that data collected in the 1972 Baseline Environmental Investigation.

Preliminary Planning for Small Craft Facilities in East Hawaii, March 1978

This report discusses 23 potential small craft harbor locations in the three districts around Hilo: Puna, Hilo, and North Hilo. The 13 sites shown in the report formed the basis for the preliminary stage of plan formulation outlined in Appendix B and Section III of the Main Report. The Small Craft Facilities report gives the needs, as seen at that time, of the three areas. (Since reproduction of the report, the navigation improvements recommended for Pohoiki have been constructed.) The report contains projections of future boating needs and design standards applicable for small boat harbors.

The results of two public workshops held in May and June 1977 to discuss the potential sites and to discuss the navigation problems of the area in general are presented. The sites were assembled prior to the workshops from community input, agency recommendations, and field observations. The concepts and conclusions presented are based on the opinions and comments received at the workshops. No firm recommendations are presented, only conclusions about the navigation needs of the three areas.

Biological Resources, Hilo Area Comprehensive Study, March 1979

This report was prepared by the US Fish and Wildlife Service for the Corps of Engineers as a baseline description of fish, wildlife, and environmental values to be considered in the HACS. The report has descriptions of the study area and the terrestrial and aquatic ecosystems found in the study area, including characteristics and unique resources of those ecosystems. The

report concludes that there are considerable opportunities to conserve and protect the native fish and wildlife within the study area. The needs of the study area are listed as the need for continued study and research, the need to assess the impacts and incorporate mitigation measures for those impacts into water resource development projects, and the need to institute management programs. Recommendations are given to satisfy these needs within the study area in general and in the individual ecosystems and other unique areas found within the study area.

Geological, Biological and Water Quality Investigations of Hilo Bay, October 1980

The purpose of these investigations was to expand the data base collected in earlier investigations performed for HACS (Hilo Harbor First Spring Season Environmental Studies 1977, August 1977), providing a basis for impact evaluation of potential projects in the Hilo Bay area. Measurements were taken of geological and biological characteristics, circulation, and water quality and an evaluation made of existing information. While the results of this series of studies did not seem to contradict earlier data, there were indications that the water quality of the bay is improving and that the amount of live coral in the bay may be slowly increasing.

Hilo Bay: A Chronological History--Land and Water Use in the Hilo Bay Area, Island of Hawaii, March 1981

This report presents a chronological history of Hilo and the areas around Hilo Bay, beginning in the early time of the Hawaiian chiefs and ending in 1980. The document discusses in detail the important industries of the area, the rise and demise of the railroad in Hilo, the importance of the bay and later the harbor, the calamities that strike Hilo, the manmade changes to the bay and the inland areas, and the changing patterns of lifestyles and inhabitants. It includes many old maps and pictures that greatly enhance the text.

Hilo Area Comprehensive Study: Draft Navigation Report and Draft Environmental Impact Statement, August 1981

This report tentatively recommended deepening Hilo Harbor to 40 feet from the existing 35 feet to accommodate larger ships. Construction of a new small-craft harbor was also tentatively recommended at King's Landing. This report was circulated to the public for discussion and review.

Hilo Harbor Hawaii, Survey Report and Final Environmental Impact Statement, January 1982

This final report forwarded to the Board of Engineers for Rivers and Harbors recommended deepening Hilo Harbor to 39 feet in the entrance channel and 38 feet in the turning basin. The recommendation to construct a new small-craft harbor for commercial fishermen was held back pending selection of a suitable site.

LIST OF LIBRARIES

Hawaii Volcanoes National Park Library
Hawaii National Park, HI 96718

Hawaii Public Library
Hawaiian Room
300 Waianuenue Avenue
Hilo, HI 96720

Serials Department
University of Hawaii at Hilo Library
1400 Kapiolani Street
Hilo, HI 96720

Library
Hawaii Community Colleges
1175 Manono Street
Hilo, HI 96720

Lyman House Memorial Museum
Library
276 Haili Street
Hilo, HI 96720

Hawaii Public Library
Hawaii Mediamobile
300 Waianuenue Avenue
Hilo, HI 96720

Hawaii Public Library
Holualoa, HI 96725

Hawaii Public Library
77-140 Hualalai Road
Kailua-Kona, HI 96740

Hawaii Public Library
Kamuela, HI 96743

Puu Kohola Heiau
National Historic Park
Library
Kawaihae, HI 96743

Hawaii Public Library
Kohala, HI 96755

Hawaii Public Library
Keaau, HI 96749

Hawaii Public Library
Kealakekua, HI 96570

Hawaii Public Library
Honokaa, HI 96727

Hawaii Public Library
Laupahoehoe, HI 96764

Hawaii Public Library
Mountain View, HI 96771

Hawaii Public Library
Pahala, HI 96777

Hawaii Public Library
Pahoa, HI 96778